8. BYCATCH

The Magnuson-Stevens Act defines bycatch as fish which are harvested in a fishery, but which are not sold or kept for personal use, and includes economic and regulatory discards. As a result, other species such as seabirds and marine mammals are considered "incidental catch." This chapter provides a brief overview of the actions NOAA Fisheries has taken to reduce bycatch and incidental catch in HMS fisheries and any results of those actions. A more comprehensive review will be conducted during the development of Amendment 2 to the HMS FMP.

8.1 Bycatch Reduction Strategy

The NOAA Fisheries HMS bycatch reduction program includes an evaluation of current data collection programs, implementation of bycatch reduction measures such as gear modifications and time/area closures, and continued support of data collection and research relating to bycatch. Details on bycatch and bycatch reduction measures can be found in Section 3.5 of the HMS FMP, in Regulatory Amendment 1 to the HMS FMP (NOAA Fisheries, 2000), in Regulatory Adjustment 2 to the HMS FMP (NOAA Fisheries, 2002), and in Amendment 1 to the HMS FMP. In addition, a Bycatch Implementation Plan was developed in late 2003 which identifies priority issues to be addressed in the following areas: (1) monitoring, (2) research, (3) management, and (4) education/outreach. Individual activities in each of these areas will be undertaken during 2004-05 and new activities may be added or removed as they are addressed or identified.

Bycatch Reporting Methodology

NOAA Fisheries utilizes self-reported data (HMS logbook program and the new supplemental discard report form in the reef fish, snapper-grouper, king and Spanish mackerel, and shark logbook programs), at-sea observer data, and survey data (recreational fishery dockside and telephone surveys) to produce bycatch estimates.

Marine Mammals

NOAA Fisheries 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. Final 2002 stock assessment reports are available and can be obtained on the web at: http://www.nmfs.noaa.gov/prot_res/PR2/Stock_Assessment_Program/sars.html#Overview.

The final 2003 Marine Mammal Protection Act (MMPA) List of Fisheries published on July 15, 2003 (68 FR 41725). The Atlantic Ocean, Caribbean, and Gulf of Mexico large pelagics longline fishery is classified as Category I (frequent serious injuries and mortalities incidental to commercial fishing) and the southeastern Atlantic shark gillnet fishery is classified as Category II (occasional serious injuries and mortalities). The following fisheries are classified as Category III (remote likelihood or no known serious injuries or mortalities): Atlantic tuna purse seine; Gulf of Maine and mid-Atlantic tuna, swordfish, and shark hook-and-line/harpoon, southeastern

mid-Atlantic and Gulf of Mexico shark bottom longline, and mid-Atlantic, southeastern Atlantic, and Gulf of Mexico pelagic pelagic hook-and-line/harpoon fisheries. For additional information on the fisheries categories and how fisheries are classified, see http://www.nmfs.noaa.gov/prot_res/PR2/Fisheries_Interactions/list_of_fisheries.html.

Sea Turtles

NOAA Fisheries has taken several steps in the past few years to reduce sea turtle bycatch and bycatch mortality in domestic longline fisheries. These include requirements to carry and to use line clippers and dipnets to remove gear on incidentally captured sea turtles, handling and release guidelines designed to minimize injury, closed areas, and gillnet tending requirements. In addition, an experimental fishery was conducted in the Northeast Distant Statistical Reporting area (NED) during 2001-03. The results of the experiment are currently being analyzed.

Seabirds

The National Plan of Action for Reducing the Incidental Catch of Seabirds in Longline Fisheries was released in February 2001. The NPOA for Seabirds calls for detailed assessments of longline fisheries, and, if a problem is found to exist within a longline fishery, for measures to reduce seabird bycatch be developed within 2 years. Because interactions appear to be relatively low in Atlantic HMS longline fisheries, the adoption of immediate measures is unlikely.

8.2 Bycatch of Highly Migratory Species in Other Fisheries

NOAA Fisheries is concerned about bycatch mortality of Atlantic HMS in any federal or state-managed fishery which captures them. NOAA Fisheries 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. NOAA Fisheries continues to solicit bycatch data on HMS from all state, interjurisdictional, and federal data collection divisions. NOAA Fisheries supports development of an interstate plan for coastal sharks by the Atlantic States Marine Fisheries Commission which would support protection of sharks caught incidentally by state-managed fisheries.

Squid Mid-Water Trawl

U.S. squid trawl fishermen, using mid-water gear, landed 4.8 mt ww of yellowfin tuna, skipjack tuna, albacore tuna, bigeye tuna, and swordfish in 2002 incidental to the squid, mackerel, and butterfish trawl fishery (Table 8.1). Bycatch of HMS in other trawl fisheries may be included as a portion of the overall reported trawl landings in Table 8.1. Landings decreased from 2001 for yellowfin tuna, and increased slightly for swordfish. 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.

Table 8.1 Atlantic HMS Landed (mt ww) Incidental to Trawl Fisheries, 1998-2002. Data based on tally sheets submitted to NOAA Fisheries (NOAA Fisheries, 2003).

Species	1998	1999	2000	2001	2002
Yellowfin tuna	0.7	4.1	1.76	2.7	0.3
Skipjack Tuna	0.2	1.0	0.04	0.2	<0.05
Bigeye Tuna	0.5	1.2	1.7	0.4	0.3
Albacore	2.4	0.4	0.03	0.0	0.3
Swordfish	5.9	7.5	10.9	2.5	3.9
Total	**9.7**	**14.2**	**14.43**	**5.8**	**4.8**

Menhaden Purse Seine

In the menhaden purse seine fishery, sharks were caught incidentally in approximately 30 percent of the purse seine sets (DeSilva *et al.,* 2001). Ten species of sharks were identified with blacktip sharks being the most common species. Approximately 20 percent of the sharks were not identified to species. An estimated 30,000 sharks were taken in this fishery annually in 1994 and 1995. At the time of release, 75 percent of sharks were dead, 12 percent were disoriented, and 8 percent were healthy. No new data are available at this time.

Shrimp Trawl Fishery

Shark bycatch in the shrimp trawl fishery consists mainly of sharks too small to be highly valued in the commercial market. As a result, few sharks are retained. Bycatch estimates of LCS in this fishery have been generated and were reviewed in the most recent LCS assessment (Cortes *et al.,* 2002). Annual estimates of bycatch ranged from zero to almost six million sharks from 1992 to 1997 (Cortes, 2002). Requirements for turtle excluder devices in this fishery have probably resulted in less bycatch because sharks are physically excluded from entering the gear. Bycatch of the SCS complex in the Gulf of Mexico shrimp trawl fishery consists mainly of Atlantic sharpnose and bonnethead sharks (Cortes, 2002). Estimates of the bycatch of SCS ranged from 3.2 to 1.3 million sharks per year from 1972-2000.

8.3 Preliminary Analysis of the Effectiveness of Current Time/Area Closures

8.3.1 Objectives

During the past several years, NOAA Fisheries has implemented several time/area closures in the Atlantic Ocean and the Gulf of Mexico to reduce discards and bycatch. During the formulation of the rules implementing these measures, NOAA Fisheries utilized logbook data to estimate the effect of the closures on discarded species and target catch. Based on the nature of the data and the nature of the fishery, it is difficult to assess with any certainty what the impacts will be prior to a closure. For example, as a result of a time/area closure, fishermen may shift their effort to a different area, they may change gear, or they may leave the fishery. These

decisions could change the estimates. Thus, the most effective way to assess the impact is to examine the data available in the time after the closure has been implemented.

The 2001-02 fishing years provide the first data following the implementation of most of the HMS area closures. The following provides an overview of the effectiveness of the closures in reducing discards and bycatch and in maintaining target catch for the entire fishery. Because the following analyses are based only on two year's worth of data, any results should be considered preliminary. A more complete review of the effectiveness of the closures will be conducted during the development of Amendment 2 to the HMS FMP.

8.3.2 Methods

Data used in these analyses were taken from the HMS Logbook database administered through the NOAA Fisheries Southeast Region. These analyses are based on self-reported data and have not been compared to observer data. Catch data for each species and the number of hooks were summarized on a monthly basis by year. The monthly and annual Atlantic wide totals were calculated for each species as well. A reference period of 1999-2000 was chosen for the initial comparisons to examine the effect of closures implemented in 2001. The percent change in 2001-02 from 999-2000 in numbers kept and discarded were calculated for the entire Atlantic (Tables 8.2 and 8.3). Future analyses will also include: (1) a comparison of 1999-2001 data to pre-1999 data; (2) a comparison of the location of fishing effort before and after the closures; and (3) an economic analysis to estimate the impact on individual fishermen, to evaluate changes in fishing behavior as a result of implementation of the closures.

8.3.3 Results

U.S. Domestic Fishery (Atlantic Ocean and Gulf of Mexico)

The cumulative effects of the individual area closures were examined by comparing the 2001-02 catch and discards to the average for 1999-2000 throughout the entire U.S. Atlantic fishery. Changes in the numbers of fish caught and discarded were compared to the predicted values from Amendment 1 to the HMS FMP (NOAA Fisheries, 2000). Overall effort, expressed as the number of hooks set, declined by 7.3 percent (Table 8.4). Declines were noted for both numbers of kept and discards of almost all of the species of note: swordfish, tunas, sharks, billfish and sea turtles. The only exceptions being the number of pelagic sharks kept increased 8.2 percent and spearfish discards increased 24.5 percent (Table 8.3). Relatively low numbers of spearfish are caught each year such that small increases in the actual number caught can appear to represent a large increase. Discards of swordfish, bluefin, yellowfin, and bigeye tuna, large coastal sharks, wahoo, blue and white marlin, and sailfish, all declined by more than 20 percent.

The declines in swordfish kept and discarded, large coastal sharks kept and discarded, and sea turtles caught were similar to the predicted values developed for Amendment 1 (Tables 8.2 and 8.3). Discards of bluefin tuna, pelagic sharks, all billfish with the exception of spearfish, and total BAYS caught all declined more than the predicted values. The number of pelagic sharks kept increased more than the predicted values and the number of dolphin kept declined less than

predicted.

Individual Closed or Restricted Areas

A detailed analysis of the effects of each of the closed or restricted areas will be conducted during the development of Amendment 2. A brief overview is presented here. The De Soto Canyon closure went into effect on November 1, 2000, as a result of the implementation of Regulatory Amendment 1 to the HMS FMP (NOAA Fisheries, 2000). Based on data presented in the 2003 SAFE Report, compliance with this closure was almost 100 percent. Since the number of hooks reported set in the Gulf of Mexico has remained relatively constant (3.4 to 3.6 million hooks), effort from the closed area is assumed to have shifted into open areas in the Gulf (Table 8.4).

The Charleston Bump Closure Area was implemented by Regulatory Amendment 1 to the HMS FMP, effective March 1, 2001 (66 FR 8903; February 5, 2001 and NOAA Fisheries, 2000). This area is closed from February to April of each year. In comparing the percent change from 1999-2000 to 2001 (Tables 8.4 and 8.5, 2003 SAFE Report), most of the species kept and discarded showed declines, but to a lesser extent than the Florida East Coast and De Soto Canyon areas because it is not a year-round closure.

The Florida East Coast Closure was implemented by Regulatory Amendment 1 to the HMS FMP, effective March 1, 2001 (66 FR 8903; February 5, 2001 and NOAA Fisheries, 2000). In comparing the percent change from 1999-2000 to 2001 (Tables 8.4 and 8.5; 2003 SAFE Report), most of the species categories showed considerable declines (80-100 percent) which was expected since this was intended to be a year-round closure.

The Northeast Distant Statistical Reporting (NED) Area was closed by an emergency rule on July 15, 2001 (July 13, 2001; 66 FR 36711), to reduce interactions with sea turtles in the pelagic longline fishery. The closure was implemented on a more permanent basis by a final rule published on July 9, 2002 (67 FR 45393). In an effort to test experimental fishing measures designed to reduce the incidental capture of sea turtles in pelagic longline gear, NOAA Fisheries has recently sponsored an experimental fishery in the NED area.

Table 8.2 **Total number of swordfish, bluefin tuna, yellowfin tuna, bigeye tuna, total BAYS (bigeye, albacore, yellowfin and skipjack tuna), reported landed or discarded in the U.S. Atlantic pelagic longline fishery, 1995-2002. Source: Pelagic Longline Logbook data.**

Year	Number of hooks set (x1000)	Swordfish kept	Swordfish discards	Bluefin Tuna kept	Bluefin Tuna discards	Yellowfin Tuna kept	Yellowfin Tuna discards	Bigeye Tuna kept	Bigeye Tuna discards	T BAY
1995	10,182	72,619	29,749	232	2,851	81,869	2,934	22,416	1,323	
1996	10,311	73,252	24,043	198	1,701	64,064	2,180	17,355	1,168	
1997	9,638	68,691	20,433	178	681	74,035	1,847	21,405	1,611	

1998	8,019	70,310	23,234	231	1,320	54,662	2,628	19,259	874	
1999	7,902	67,120	20,558	263	604	83,619	2,885	22,467	906	1
2000	7,976	62,978	17,074	235	737	72,385	1,769	13,678	344	
2001	7,564	47,560	13,993	177	348	52,337	1,798	18,216	554	
2002	7,150	49,320	13,035	178	585	59,255	1,635	13,826	277	
1999-00	7,939	65,049	18,816	249	671	78,002	2,327	18,073	625	1
2001-02	7,357	48,440	13,514	178	467	55,796	1,717	16,021	416	
% dif	(7)	(26)	(28)	(29)	(30)	(29)	(26)	(11)	(34)	
Pred [1]		(25)	(42)		(1)					
Pred [2]		(13)	(31)		11					

[1] Predicted change without effort redistribution (Table 7.19; NOAA Fisheries, 2000)
[2] Predicted change with effort redistribution (Table 7.19; NOAA Fisheries, 2000)

Table 8.3 **Total number of pelagic sharks, large coastal sharks, dolphin (mahi mahi), and wahoo reported landed or discarded and number of billfish (blue and white marlin, sailfish, spearfish) and sea turtles caught and discarded in the U.S. Atlantic pelagic longline fishery, 1995-2002. Source: Pelagic Longline Logbook data.**

Year	Pelagic Sharks kept	Pelagic Shark discards	Large Coastal Sharks kept	Large Coastal Shark discards	Dolphin Kept	Dolphin discards	Wahoo kept	Wahoo discards	Blue Marlin discards	White Marlin discards	Sailfish discards	Spearfish discards	Sea Turtles
1995	5,654	90,182	25,186	8,242	71,884	4,152	5,275	442	2,872	3,150	1,167	430	1,127
1996	5,432	85,026	20,248	10,221	36,863	871	3,733	502	3,092	2,503	1,464	565	492
1997	5,078	81,518	13,217	7,762	62,770	1,201	4,503	90	2,290	2,422	1,735	380	267
1998	3,717	44,516	6,401	5,470	23,503	298	5,253	305	1,295	1,506	843	103	886
1999	2,894	28,967	6,382	5,442	31,536	320	5,136	128	1,253	1,969	1,407	151	631
2000	3,065	28,046	7,896	6,973	29,125	292	4,193	46	1,443	1,261	1,091	78	271
2001	3,460	23,813	6,478	4,836	27,586	325	3,068	62	635	848	356	137	424
2002	2,987	22,828	4,077	3,815	30,384	185	4,188	32	1,175	1,438	379	148	465
1999-00	2,980	28,507	7,139	6,208	30,331	306	4,665	87	1,348	1,615	1,249	115	451
2000-02	3,224	23,321	5,278	4,326	28,985	255	3,628	47	905	1,143	368	143	445
% dif	8	(18)	(26)	(30)	(4)	(17)	(22)	(46)	(33)	(29)	(71)	25	(1)
Pred [1]	(10)	(2)	(32)	(43)	(29)				(12)	(6)	(30)		(2)
Pred [2]	4	8	(19)	(33)	(18)				7	11	(14)		7

[1] Predicted change without effort redistribution (Table 7.19; NOAA Fisheries, 2000)

[2] Predicted change with effort redistribution (Table 7.19; NOAA Fisheries, 2000)

Table 8.4 **Reported distribution of hooks set by area, 1995-2002 (CAR=Caribbean, GOM=Gulf of Mexico, FEC=Florida East Coast, SAB=South Atlantic Bight, MAB=Mid-Atlantic Bight, NEC=Northeast Coastal, NED=Northeast Distant, SAR=Sargasso, NCA=North Central Atlantic, and SAT=South Atlantic). Source: Pelagic Longline Logbook data.**

Year	CAR	GOM	FEC	SAB	MAB	NEC	NED	SAR	NCA	SAT	Total
1995	688,754	2,662,303	646,841	852,230	2,394,364	1,072,433	765,485	16,430	785,727	297,730	10,182,297
1996	651,673	3,530,127	574,284	1,588,944	1,039,594	1,137,229	588,782	87,285	501,674	611,116	10,310,708
1997	473,500	3,402,436	784,920	946,220	1,203,832	1,226,406	688,344	21,640	209,946	680,563	9,637,807
1998	333,766	3,003,054	667,592	719,125	1,319,860	883,059	503,579	3,500	247,457	338,191	8,019,183
1999	177,628	3,619,402	709,809	769,738	1,276,008	587,225	338,719	17,795	117,031	288,434	7,901,789
2000	259,369	3,648,345	700,505	810,272	1,032,173	610,103	544,549	10,959	236,864	122,390	7,975,529
2001	196,733	3,453,533	467,155	725,951	1,092,030	865,531	316,559	11,437	256,383	178,639	7,563,951
2002	169,562	3,577,753	495,245	435,231	1,011,138	550,096	456,668	104,165	215,121	135,252	7,150,231
1999-00	218,499	3,633,874	705,157	790,005	1,154,091	598,664	441,634	14,377	176,948	205,412	7,938,659
2001-02	183,148	3,515,643	481,200	580,591	1,051,584	707,814	386,614	57,801	235,752	156,946	7,357,091
% dif	(16)	(3)	(32)	(27)	(9)	18	(12)	302	33	(24)	(7)

The June Mid-Atlantic Bight (MAB) closure area was implemented as part of the implementation of the HMS consolidated regulations (64 FR 29090; May 28, 1999) in order to decrease bluefin tuna bycatch in the pelagic longline fishery. Caution should be exercised in evaluating the effectiveness of this closure with the 2001-02 data since it was already in effect in 1999 and 2000. Further evaluation of this closure may be possible by examining pre-1999 data. Large decreases in the number of bluefin tuna kept (-60 percent) and discarded (-81.5 percent), yellowfin tuna kept (-50.6 percent) and discarded (-88.7 percent), bigeye tuna kept (-33.1 percent) and discarded (-46.6 percent) and pelagic sharks discarded (-47.9 percent) occurred in 2001 relative to the average for 1999-2000 (Tables 8.4 and 8.5; 2003 SAFE Report).

It appears that bluefin tuna discards in the MAB have been reduced considerably since 1998 due to the June closure (Table 8.5). Annual landings and discards of bluefin tuna from both the MAB closure area and remaining open areas were reduced in 2001 but increased in 2002. These data also indicate that discards of swordfish and pelagic sharks from the MAB closure area were reduced in 2001. The number of pelagic sharks kept increased in both the open areas and the MAB closure area in 2001 but decreased again in 2002. Landings of large coastal sharks from the MAB closed area doubled in 2001 but declined to previous levels the following year. Discards of billfish increased in the MAB closure area in 2001, declining to only 44 fish in 2002, while in the open areas billfish discards declined in 2001 but increased to just under previous levels in 2002.

Change in Effort Distribution

A preliminary review of the distribution of effort in the pelagic longline fishery based on the reported number of hooks set does not indicate any major shift in fishing effort as a result of the time/area closures (Table 8.4). The average number of hooks reported set in 2001-02 by area were compared to the average from 1999-2000. Declines were noted for the majority of fishing areas. The increase in effort in the NEC might be a result of the June Mid-Atlantic Bight closure as well as the closure of the NED. Changes in effort distribution will be reviewed in more detail during the development of Amendment 2 to the HMS FMP.

Table 8.5 **Number of bluefin tuna, swordfish, sharks, billfish, and turtles kept and discarded inside and outside of the June, Northeast/Mid-Atlantic Bight as reported in the pelagic logbook data.**

Species	Closed area								Open area							
	1995	1996	1997	1998	1999	2000	2001	2002	1995	1996	1997	1998	1999	2000	2001	2002
BFT kept	55	47	39	43	20	15	7	4	177	151	140	188	243	220	170	174
BFT discarded	1,877	1,345	417	598	30	229	24	71	974	356	264	722	574	508	324	514
Swordfish kept	2,677	1,188	2,567	4,247	1,656	4,300	2,826	2,671	69,942	72,064	66,124	66,063	65,464	58,678	44,734	46,649
Swordfish discarded	2,336	194	1,234	1,918	990	1,269	1,049	1,022	27,413	23,849	19,199	21,316	19,568	15,805	12,944	12,013
Pelagic sharks kept	934	473	486	471	276	432	635	331	4,720	4,959	4,592	3,246	2,618	2,663	2,825	2,656
Pelagic sharks discarded	18,314	17,868	17,646	13,499	5,378	5,430	2,816	1,711	71,868	67,158	63,872	31,017	23,589	22,616	20,997	21,117
LCS kept	1,787	3,440	1,726	860	1,030	1,040	2,118	1,060	23,399	16,808	11,491	5,541	5,352	6,856	4,360	3,017
LCS discarded	355	214	77	64	90	129	156	146	7,887	10,007	7,685	5,406	5,352	6,844	4,680	3,669
Billfish discarded	564	321	384	161	411	93	130	44	7,055	7,303	6,444	3,586	4,369	3,780	1,846	3,096
Turtle interactions	61	6	19	29	49	15	16	10	1,066	486	248	857	582	256	408	455

8.3.4 Prohibition of Live Bait in the Gulf of Mexico

Regulatory Amendment 1 to the HMS FMP prohibited the use of live bait on pelagic longline gear in the Gulf of Mexico due to concerns over the incidental bycatch of billfish. Based on reported data, the number of hooks set with live bait or a combination of live and dead bait in the Gulf of Mexico decreased from 22.7 percent in 2000, to 1.7 percent in 2001 and less than 0.4 percent in 2002 (Table 8.6). The number of hooks set with no bait type specified increased from zero in 1999-2001 to almost 2 percent in 2002. Overall, the number of hooks set in the Gulf of Mexico in 2002 increased by almost 11 percent from 2001. Further analysis of the effectiveness of the live bait prohibition in the Gulf of Mexico pelagic longline fishery may continue in 2004.

Table 8.6 Comparison of the number of hooks set in the Gulf of Mexico with dead or live bait, or a combination of both baits, 1999-2001 (numbers in parentheses are percent of the total number of hooks set in the Gulf of Mexico). Source: Pelagic Longline Logbook data.

Bait Type	Year			
	1999	2000	2001	2002
Dead	2,335,845 (70.9)	2,598,083 (77.3)	3,176,493 (98.3)	3,494,577 (97.63)
Live	372,162 (11.3)	259,256 (7.7)	5,500 (0.2)	750 (0.02)
Both	584,473 (17.8)	505,582 (15.0)	49,250 (1.5)	13,115 (0.37)
Unknown	0	0	0	71,011 (1.98)
Total	3,292,480	3,362,921	3,231,243	3,579,453

8.3.5 Conclusions

Based on two years of self-reported data, it appears as though the time/area closures and live bait prohibition in the Gulf of Mexico have been successful at reducing some bycatch in the HMS pelagic longline fishery. Billfish discards, except for spearfish, have all declined. The number of turtles caught, swordfish discarded, bluefin tuna discarded, and large coastal sharks have also declined. However, the number of target species kept such as swordfish and yellowfin tuna, have also decreased. This is contrary to the other objective of the regulations to minimize the reduction in target catch. All of these results should be considered preliminary. Additional years of data are needed before the effect of these measures can be analyzed fully. As described in the methods section of this subsection, NOAA Fisheries plans to continue to analyze these measures as additional data becomes available.

8.4 Evaluation of Other Bycatch Reduction Measures

A detailed review of additional management measures or issues that may address bycatch reduction will be included in the development of Amendment 2. NOAA Fisheries is currently developing a Sea Turtle Bycatch Mitigation Rule to address sea turtle bycatch in HMS Fisheries. When implemented, the measures contained in the rule should reduce the bycatch of endangered and threatened sea turtles as well as bycatch of other non-target fish species such as billfish. NOAA Fisheries continues to monitor and evaluate bycatch in HMS fisheries through direct enumeration (pelagic and bottom longline observer programs, shark gillnet observer program), evaluation of management measures (closed areas), and vessel monitoring systems (VMS).

8.5 Recent Bycatch Analyses of HMS Fisheries

8.5.1 October 2003 Biological Opinion

A new Biological Opinion for Atlantic shark fisheries was prepared in October 2003 in response to the proposed measures in Amendment 1 to the HMS FMP. It concluded that the continued operation of the shark fisheries as amended by the actions in Amendment 1 would not adversely affect marine mammals. However, other protected resources, specifically sea turtles and smalltooth sawfish, may be affected but were not likely to appreciably reduce their survival or recovery. Sea turtles and smalltooth sawfish have been documented as taken incidentally in one or more components of the Atlantic shark fishery. A detailed review of the October 2003 BiOp can be found in Amendment 1 to the HMS FMP (NOAA Fisheries, 2003).

8.5.2 Bycatch of Marine Mammals and Sea Turtles in the U.S. Atlantic Pelagic Longline Fishery

NOAA Fisheries has recently analyzed the marine mammal and sea turtle bycatch in the U.S. Atlantic pelagic longline fishery from 2001 and 2002 (Garrison, 2003). The primary marine mammal species interacting with this fishery were pilot whales (*Globicephala sp.*) and Risso's dolphin (*Grampus griseus*). There were also interactions with leatherback (*Dermochelys coriacea*) and loggerhead sea turtles (*Caretta caretta*). Additional interactions were observed with striped dolphin (*Stenella coeruleoalba*), common dolphin (*Delphinus delphis*), northern bottlenose whale (*Hyperodon sp.*) and two unidentified marine mammals.

The majority of marine mammal serious injury and mortality occurred in the mid-Atlantic Bight during the second quarter. Pilot whales and Risso's dolphin were the only marine mammal species with observed interactions and mortality outside of the Northeast Distant Water (NED) experimental fishery. During 2001, high incidental takes of leatherback turtles occurred during quarter 1 off the Florida east coast (FEC) and in the Gulf of Mexico (GOM) in the 2nd and 3rd quarters. Leatherback interactions during 2002 were mainly in the GOM, primarily during the 2nd - 4th quarters. The highest takes of loggerhead turtles occurred during the 3rd quarter in the Northeast Coastal area (NEC) in 2001 and the NEC and GOM during the 2nd quarter of 2002.

A total of 70.2 pilot whales and 69.3 Risso's dolphin were estimated to have suffered serious injury or mortality in the longline fishery during 2001, and 53.9 pilot whales and 28.4 Risso's dolphin in 2002. There were an additional 4 documented serious injuries of Risso's dolphin

during the NED experiment in 2001 and 3 in 2002.

An total of 1208.4 and 962.3 leatherback turtle interactions were estimated to have occurred in 2001 and 2002. The majority of interactions in 2001 occurred in the FEC, GOM, SAB and MAB. During 2002, the interactions with leatherback turtles was very high in the Gulf of Mexico while in other regions the 2002 levels were considerably lower than 2001. There were an estimated total of 331.8 loggerhead interactions during 2001 and 574.6 during 2002. The majority of these occurred in the NEC in 2001 and in the NEC, GOM, FEC, and MAB during 2002. During the NED experimental fishery, there were an additional 77 and 158 interactions with leatherback turtles during 2001 and 2002. There were 142 and 100 interactions with loggerhead turtles in 2001 and 2002 during the NED experimental fishery.

8.6 Recommendations to Reduce Bycatch

In 1998, NOAA Fisheries published a National Bycatch Plan (NOAA, 1998). The plan recommended numerous actions to address bycatch mortality. A summary of recommendations and actions taken by NOAA Fisheries to address these issues was included in the 2003 SAFE Report. Many of the same activities were continued in 2003 and will be reviewed in Amendment 2. A draft HMS Bycatch Implementation Plan was developed in 2003 and identifies priority issues to be addressed for: (1) monitoring, (2) research, (3) management, and (4) education/outreach. The plan is available on the web at: http://www.nmfs.noaa.gov/bycatch.html.

In Table 3.47 of the HMS FMP, NOAA Fisheries identified the significance of bycatch of certain species in various HMS fisheries. Actions NOAA Fisheries has taken to address those issues and reduce bycatch were summarized in Table 8.10 of the 2003 SAFE Report.

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