

RESULTS OF UNITED STATES TAGGING OF ATLANTIC BILLFISHESJANUARY 1, 1972 - SEPTEMBER 30, 1975

by

F.J. Mather, J.M. Mason, C.C. Buchanan

SUMMARY

United States tagging of Atlantic billfishes since 1971 has been carried on by sport fishermen cooperating with the Woods Hole Oceanographic Institution (WHOI), and the National Marine Fisheries Service (NMFS).

Thirty-three hundred and forty-four Atlantic sailfish, Istiophorus platypterus, 391 blue marlin, Makaira nigricans, 1,445 white marlin, Tetrapturus albidus, and 28 broadbill swordfish, Xiphias gladius, were tagged between December 31, 1971, and September 30, 1975. In this period, tags were returned by various fisheries from 37 Atlantic sailfish, 4 blue marlin, 43 white marlin and 1 broadbill swordfish. The cumulative total releases and returns by species as of September 30, 1975, were as follows (releases after slash, returns before slash): Atlantic sailfish, 144/17,188, blue marlin 9/1,068, white marlin 172/10,016, and broadbill swordfish, 3/85. The return rates are 0.8, 0.8, 1.7, and 3.5 percent, respectively.

A previously described migratory pattern for the group of white marlin which concentrates in summer off the central United States Atlantic coast was strongly supported. Times at liberty indicated a mortality rate of 30% per year for these fish, and provided further evidence of the longevity of the species. Scattered results suggest tentative migratory patterns for other groups of white marlin.

Seasonal migrations of Atlantic sailfish between southern and northern waters, and between the Gulf of Mexico and the southeastern Florida - northwestern Bahamas area have been recorded, but the over-all picture remains unclear.

No conclusions can be drawn from the few returns obtained from broadbill swordfish and blue marlin.

The complete definition of subpopulations and their migratory patterns require intensified tagging in certain areas and seasons for white marlin and Atlantic sailfish, and on an over-all basis for broadbill swordfish and blue marlin.

This document updates previous reports on United States taggings of Atlantic billfishes (FAO, 1972; SCRS/72/31) to include results obtained from January 1, 1972 through September 30, 1975. The tagging of Atlantic billfishes was initiated by the Marine Laboratory (now Rosenstiel School of Marine and Atmospheric Science, RSMAS) of the University of Miami (1950-1958) followed by the Port Aransas Rod and Reel Club (PARR) (1954-1962) and the Cooperative Game Fish Tagging Program (CGFTP) of the Woods Hole Oceanographic Institution (WHOI), which became a joint National Marine Fisheries Service (NMFS) - WHOI program in 1974. NMFS is represented in this program by the Southeast Fisheries Center (SEFC) at Miami, Florida. This and the previous reports also include the swordfish tagging results of the shark tagging program of the Narragansett Sport Fisheries Marine Laboratory (NSFML) of NMFS through the courtesy of John Casey.

Nearly all of the taggings and returns must be credited to sport fishermen who cooperated in the various programs. These individuals tagged some of their catches, on a volunteer basis, with equipment distributed by the various agencies. The tags and tagging techniques used are described in Mather (1963), FAO (1972) and Mather, Tabb, Mason and Clark, (1974).

Thirty-three hundred and forty-four Atlantic sailfish, Istiophorus platypterus, 391 blue marlin, Makaira nigricans, 1445 white marlin, Tetrapturus albidus, and 28 broadbill swordfish, Xiphias gladius, were tagged between December 31, 1971, and September 30, 1975. In this period, 37 returns from Atlantic sailfish, 4 from blue marlin, 43 from

white marlin and 1 from broadbill swordfish were obtained. These figures include returns obtained in this period from taggings in previous years. The cumulative totals for releases and returns by species as of September 30, 1975, were as follows (releases after slash, returns before slash): Atlantic sailfish, 144/17,188, blue marlin 9/106, white marlin 172/10,016, and broadbill swordfish 3/85. These results are discussed by species in the following paragraphs.

#### Atlantic sailfish

The great majority of the taggings (3376) of Atlantic sailfish occurred in the area of intensive sport fishing off southeastern Florida and the Florida Keys, between Fort Pierce and Key West, and most of the recaptures (29) resulted from these taggings (Table 1). Most of the recaptures were also in this area, but a few important ones took place elsewhere or resulted from taggings in other areas or in earlier years. The release data for two of the returned tags are not yet available.

Twenty-six of the sailfish released in the Fort Pierce-Key West area in 1972-1975 were recaptured in the same area in that period, as well as three which had been released there in 1970-1971. Eight of these recaptures occurred within 20 miles or less of the release point. Of the others, 13 showed net southward migrations and 7 showed net northward movements. The remaining return probably also indicated a northward migration, but the recapture data are uncertain. All of the local returns were from releases in the period December - April. The southward displacements were indicated

by releases from December - February and recaptures from January - May, and one in summer. The northward movements were traced by releases in October - April and recaptures in November - July. The periods of release and recapture are probably influenced by the greater fishing intensity in the area in the winter months. Three longer migrations resulted from the 1972 - 1975 releases in the Fort Pierce - Key West area. A sailfish released in February, 1973 off Tavernier, Key Largo, Florida, was recaptured in August, 1974 off Havana, Cuba. Another tagged off Miami probably in April, 1972, was recaptured off South Pass, Louisiana, in August, 1973. The longest sailfish migration recorded in the period was from near Palm Beach in August, 1974, to off Puerto Cabello, Venezuela, in February, 1975. The only significant migration traced from another release area was from off the Virgin Islands in January, 1972, to off Fort Lauderdale, Florida in May, 1972. Other returns from fish tagged outside the southeastern Florida area showed migrations from off Bel Pass, Louisiana at an undetermined date, probably in the summer or fall of 1969, to off Port Aransas, Texas in October, 1973, and another which was tagged at the latter locality in July, 1971, and recaptured there in October, 1972. Two additional tags were recovered, but no release data has been obtained for these.

These returns, like those obtained previously, are difficult to fit into any pattern. Movements up and down the southeast Florida coast and the Keys appear to occur in a rather random manner. The recaptures of Florida fish off Havana and South Pass, however, provide additional indications of sailfish movements between the Gulf of Mexico in the warm season

and the southeast Florida coast in the cold season. The return from the Virgin Islands furnishes further evidence that fish which winter there tend to move northward in the spring. The migration from off southeastern Florida in August to off Venezuela in February together with two others from off the United States in summer or early fall to near South America in winter, which were recorded previously, may represent the reciprocal of the northward migration from the Virgin Islands.

It appears that Atlantic sailfish move up and down the southeastern Florida coast in an erratic manner in the cold season, perhaps influenced by environmental conditions and the availability of bait fish. Crossings of the Straits of Florida between the mainland and the Bahamas, however, appear to be rare. Seasonal migrations between the Straits of Florida and the Gulf of Mexico, and between more southerly areas (Virgin Islands and South America) and the continental United States occur at least occasionally. Earlier returns also indicated seasonal migrations between southeastern Florida and the Carolinas and northeastern Florida.

The times at liberty for sailfish recaptured in 1972-1975 were short, as has generally been the case for earlier captures (Table 2). Half of the fish for which we have reasonably reliable data were recaptured after less than six months at liberty, and the others after less than a year. These results confirm previous indications (Mather, Tabb, Mason and Clark, 1974) that the species is short lived.

Most of the recaptures of tagged sailfish (Table 3) have been by sport fishermen (107). Twenty-two returns have come from commercial fisheries.

The only nations whose commercial fishermen have returned significant numbers of tags from sailfish are Cuba (10) and Venezuela (7). There are no commercial fisheries for the species in United States or Bahamian waters. These facts and the distribution of tag returns suggest that the sailfish stocks which support the United States sport fisheries do not often venture into oceanic waters and are not often subjected to intensive commercial fishing:

#### Blue marlin

Blue marlin results indicate that a much more intensive effort is needed to gain information about this species. Only 391 releases have been reported since January of 1972 (FAO, 1972) and four new returns have come in during this same time. With this new information there have now been 1068 blue marlin releases in the western North Atlantic and nine recoveries reported (Table 4).

Of the four new returns we only have complete data for two. One fish was tagged in July 1971 and recaptured in the same area off the Bahamas in July 1972. The second showed the first migration from the United States Middle Atlantic coast to southern waters. It was tagged at Baltimore Canyon in August, 1972 and recaptured off Bimini, Bahamas, in June, 1975. The two fish for which data are incomplete could have been interesting. One was released off the Virgin Islands in November 1969 but the tag was returned from a Japanese cannery with no information on the recapture other than that it was early in 1974. No release data had been reported for the

other return but the tag was held by a fishermen who recalled having tagged a blue marlin in the Gulf of Mexico off Louisiana in 1970 or 1971, and the fish was recaptured off Havana, Cuba, in August, 1974.

It is important to increase the marking of this species as it has evidently been affected by longline fishing (SCRS, 1975) but to what degree is uncertain. Efforts should be concentrated on tagging small (< 100 kg) individuals, but opportunities to tag larger ones should not be overlooked.

#### Whitemarlin

Known white marlin releases since January 1974 total 1445 and 43 recaptures have occurred in this time (Table 5). No release data is presently available for five of these returns.

Thirty-four of the recoveries are from marlin known to have been released in the coastal waters between Cape Hatteras, North Carolina and Cape Cod, Massachusetts. The five for which we have no actual release data are also believed to have been tagged in this area as the tags were held by cooperators who primarily fish these waters. All but two of these returns fit very well with the cyclical migratory pattern for the group of fish which summer in these waters proposed by Mather, Jones and Beardsley (1972) (FAO, 1972) and elaborated by Mather, Mason and Clark (1974).

The two significant changes in the pattern were from fish released in the northern summering area and recaptured after one and two years at liberty, respectively, during August in the Gulf of Mexico. As this is

MS



fewer releases off Venezuela and the Bahamas. There is no doubt that valuable information on this and other groups of white marlin could be obtained by increased tagging in other areas. Since there is no local commercial demand for the species in the Bahamas, southeastern Florida, and the Gulf of Mexico, it should be possible to increase taggings in those areas, subject to the relatively limited numbers of fish caught. Increasing taggings in the Latin American nations, such as Cuba and Venezuela, would be more difficult, because the fish are in commercial demand. The relatively long life span of this species and its tendency to spend part of its annual migratory cycles in oceanic waters where extensive commercial fisheries operate favor the possibilities of tracing its migratory cycles and identifying its subpopulations.

The situation in regard to Atlantic sailfish is similar in regard to concentration of tagging off southeastern Florida where fishing is intensive and the species is not in commercial demand, and to the difficulties of increasing tagging in the Latin-American nations, where the species is utilized for food. Some increase in tagging should be possible in the Bahamas and the Gulf of Mexico, but the catch in the former area is limited, and extensive tagging in the western Gulf of Mexico and off Cozumel Island near the Yucatan Channel has produced surprisingly meager results. Limited tagging off the Virgin Islands has produced interesting returns and could perhaps be increased. The apparent short life span of this species and its tendency to avoid the major oceanic fishing areas, however, combine to increase the difficulty of obtaining definitive results.

The results from blue marlin tagging have been limited by the relatively small number of releases, and extraordinarily bad luck in regard to lack of release or recapture data, and the obliteration of tag numbers, among the few returns that have been obtained. Increased tagging of blue marlin is important, in view of the declining longline catch rates for this species previously mentioned.

The tagging of broadbill swordfish is becoming increasingly difficult because of the high prices offered for this species. The most practical method of marking this fish is by harpooning tags into free-swimming individuals. This requires specialized skill, but certainly reduces tagging mortality and should be successful if several experienced harpooners with suitable vessels could be utilized.

Considerable progress has been made with the tagging of billfishes, but a more intensified effort at a multi-national level is needed to obtain definitive results within a reasonable time span.

Table 1.—Releases (after slash) and returns (before slash) for Atlantic sailfish, *Istiophorus platypterus*, by year, areas, and programs. Returns are listed by year and area of release.

Year	Hatteras- Delaware		N.E. Florida- S. Carolina		SE Florida		Bahamas		Gulf of Mexico			Hatteras- Delaware		Totals	
	WHOI	WHOI	WHOI	FSM&S	WHOI	FSM&S	WHOI	FSM&S	Fla. & La.	Tex.	P&R	WHOI	FSM&S	WHOI	FSM&S
1950						1/78									1/78
1951						1/112									1/112
1952						2/102									2/102
1953						1/140									1/140
1954						0/227									0/227
1955						1/15									1/15
1956						0/17									0/17
1957						2/142									2/142
1958						0/17									0/17
1959						0/72									0/72
1960						5/746									5/746
1961						5/949									5/949
1962						10/1141									10/1141
1963						9/1000									9/1000
1964						6/925									6/925
1965						7/928									7/928
1966						9/565									9/565
1967						6/385									6/385
1968						6/420									6/420
1969						5/339									5/339
1970						2/254									2/254
1971						2/450									2/450
1972						5/455									5/455
1973						16/626									16/626
1974						4/489									4/489
1975 <sup>b</sup>						4/409									4/409
Unknown <sup>c</sup>						1/1									1/1
Totals	1/94	1/20	102/0219	9/1259	4/578	5/467	2/1419	3/515	7/748	7/478	1/1389	144/1188			

<sup>a</sup> Kaili 1960 - 1962, Virgin Islands 1964 - , Puerto Rico 1972 -  
<sup>b</sup> Through September 30

<sup>c</sup> Total includes two releases and returns for which release area is unknown.

## LITERATURE CITED

- Beckett, J. S.  
 1970. Swordfish, Shark and Tuna Tagging 1961-1969. Fish. Res. Bd. Canada, Tech. Rep. (193): 13 p.
- FAO Panel of Experts for the Facilitation of Tuna Research, La Jolla, California, U.S.A., 8-12 November 1971.  
 1972. Final report of the Working Party on Tuna and Billfish Tagging in the Atlantic and Adjacent Seas; FAO Fish Rep., (118) Suppl. 1: 37 p.
- Mather, F. J., III.  
 1963. Tags and Tagging Techniques for Large Pelagic Fishes. Int. Comm. Northwest Atl. Fish. Spec. Publ. 4(46): 288-293.
- Mather, F. J., III, A. C. Jones and G. L. Beardsley, Jr.  
 1972. Migration and distribution of white marlin and blue marlin in the Atlantic Ocean. Fish. Bull., U.S. 70(2): 283-298.
- Mather, F. J., III, J. M. Mason, Jr., and H. L. Clark.  
 1974. Migrations of White Marlin and Blue Marlin in the Western North Atlantic Ocean - Tagging Results Since May, 1970. From Shomura, R. S., and F. Williams (editors), Proceedings of the International Billfish Symposium, Kailua-Kona, Hawaii, 9-12 August 1972. Part 2. Review and contributed papers. NOAA Techn. Rep. NMFS SSRF-675: 211-225.
- Mather, F. J., III, D. C. Tabb, J. M. Mason, Jr., and H. L. Clark.  
 1974. Results of Sailfish Tagging in the Western North Atlantic Ocean. From Shomura, R. S., and F. Williams (editors), Proceedings of the International Billfish Symposium, Kailua-Kona, Hawaii, 9-12 August 1972. Part 2, Review and contributed papers. NOAA Techn. Rep. NMFS SSRF 675: 194-210.
- Standing Committee on Research and Statistics (SCRS), International Commission for the Conservation of Atlantic Tunas, Madrid, November 13-19, 1974.  
 1975. Report of the Standing Committee on Research and Statistics (SCRS) Madrid, November 13 - 19, 1974. In International Commission for the Conservation of Atlantic Tunas. Report for the biennial period 1974-75. Part 1 (1974) English version: 70-111.
- ICCAT WORKING DOCUMENT
- SCRS/72/31. Mather, F. J., III, and J. M. Mason, Jr.  
 1972. Summary of recent information on taggings and tag returns for tunas and billfishes in the Atlantic Ocean. ICCAT Collective Volume of Scientific Papers, Vol. I (SCRS - 1972): 501-531.

Table 3

Sailfish returns by method of recapture and nationality of recapturing vessel

	Sport	
Bahamas	Rod and Reel	1
United States	Rod and Reel	107
Venezuela	Rod and Reel	2
	<u>Commercial</u>	
British West Indies	Handline	1
Cuba	Longline	4
	"Criollo" line	6
Dominican Republic	Handline	1
Haiti	Deepline	1
Japan	Longline	2
Venezuela	Professional Fishermen Longline	6
		1
Commercial total		22
Grand total	<u>All Methods</u>	132

Table 2

Releases for Atlantic sailfish, *Istiophorus platypterus*, in the western North Atlantic, by years, and returns from these by months at liberty.

Year	Releases Number	Months at liberty							Totals	
		0-.9	1-1.9	2-5.9	6-11.9	12-17.9	18-23.9	24-35.9		48-59.9
1954	27									1
1955	16				1					
1956	0									
1957	24									
1958	28				1	1				2
1959	113									
1960	827		2	1	1	1				5
1961	1157	1		1	2	2				6
1962	1284	2	1	1	5	1				10
1963	1162	3	1	4	1					9
1964	1080	2	2	1	1					6
1965	1093	2	1	2	3	1				9
1966	1139	5		4	4		2	1	1	17
1967	828	2	2	7	1	1				13
1968	775	3	1	1	3	1	1			10
1969	763	1	1	2		1				5
1970	621	1						1		2
1971	1082				2	1		1		4
1972	917			3	1	2				6
1973	936		2	3	4	5	2			16
1974	855	1	1	1	1					4
1975	684	3	1							4
Unknown	3									3
All										
Years	15,414	26	15	31	31	17	5	3	1	132

Table 4.—Releases (after slash) and returns (before slash) for blue marlin, *Makaira nigricans*, tagged in the western North Atlantic Ocean, by year and area of release

Year	Hatteras Delaware	Oceanic No. Atlantic	SE Florida	Bahamas	Virgin Islands	Gulf of Mexico		Yucatan	Caribbean		Totals
						Fla. & La.	Texas		NW	SE	
1954											
1955							0/1			0/6	0/7
1956				0/1			0/2	0/3	0/3		0/9
1957				0/1							0/1
1958				0/1							0/1
1959	0/1										0/1
1960	0/1			0/2						0/2	0/5
1961				0/3							0/3
1962	0/8	0/1		0/4				0/1			0/14
1963	0/62		0/3	0/21		0/2	0/2				0/90
1964	0/15	0/1	0/5	0/34	0/1	0/2					0/58
1965	0/2	0/1	0/1	0/30	0/10	0/1				0/2	0/47
1966	0/1		0/1	0/24	0/6	0/3				1/9	1/44
1967	0/1			0/29	0/8	0/5	0/1				0/44
1968	0/1			1/40	0/23	0/5	0/1				1/70
1969	0/8		0/2	1/38	1/45	1/1	0/5				3/99
1970	0/18			0/21	0/24	0/2	0/2	0/1			0/68
1971	0/37			1/30	0/44	0/3		0/1			1/115
1972	1/8	0/1		0/18	0/73	0/8					4/108
1973	0/15		0/2	0/28	0/53			0/2			0/100
1974	0/8		0/1	0/12	0/64	0/4		0/1			0/96
1975	0/7			0/15	0/69	0/1	0/1				0/93
Unknown						1/1					2/1
Totals	1/193	0/4	0/15	3/352	1/420	2/41	0/12	0/9	0/9	1/13	9/1068

Table 5

Releases (after slash) and returns (before slash) for white marlin, *Tetrapturus albidus*, tagged in the western North Atlantic Ocean, by year and area of release.

YEARS	AREA										TOTALS
	Hatteras to Chesapeake	Chesapeake to Barnegat	Barnegat to Cape Cod	Oceanic North Atlantic	S.E. Florida and W. Bahamas	West Indies and Vicinity	Gulf of Mexico	Venezuela and Vicinity	Cozumel and Yucatan		
1954			0/4								0/4
1955		1/116				0/8	0/21				1/145
1956		1/402				0/2	0/8				1/413
1957	0/3	0/140	0/1	0/1							0/145
1958	0/1	0/39	0/1								0/41
1959		0/190	0/10					0/2			0/202
1960		0/96	0/2		0/4	0/1	0/4	0/4			0/111
1961	0/2	2/187	0/10		0/13	0/9	0/11	0/30			2/262
1962	0/30	4/294	0/18		0/41		0/4				4/357
1963	0/75	4/533	0/4	0/3	0/35		0/10				4/660
1964	4/182	8/258	0/1	0/5	1/67		0/13				13/526
1965	0/15	6/258	0/5		0/67	0/5	0/10	2/25			8/355
1966	1/36	9/172	1/64	0/6	1/54	0/4	0/23	4/149			16/523
1967	0/37	6/234	0/6		0/83	0/7	1/46	0/103			7/521
1968	2/102	16/369	1/32		1/55	0/16	0/56	0/36			30/556
1969	6/358	12/829	0/27		2/86	0/18	2/35	2/46			36/1259
1970	15/320	11/463	1/55		2/49	0/15	0/24	0/17	0/4		29/947
1971	4/248	13/559	0/17		1/57	0/20	1/13	1/95	0/4		20/1013
1972	2/184	1/167	0/14		0/33	0/11	0/62	0/21	0/1		3/473
1973	0/46	4/179	0/9		0/25	0/6	0/15	0/4	0/2		4/326
1974	1/47	2/172	0/2		0/12	0/4	0/30	0/5	0/4		3/276
1975	0/66	0/212	0/15		0/26		0/58	0/29	0/1		0/407
Unknown	5/5	5/5					1/1				11/11
TOTALS	42/1737	105/6074	3/297	0/15	8/755	0/127	5/449	9/346	0/16		172/10,016

Table 6

Summary of recaptures of tagged white marlin by years of release and months at liberty. Numbers of returns outside of parentheses are for fish released in northern waters; numbers in parentheses are for fish released south of 33°N. Dashed lines enclose data used for mortality estimates.

Year	Number tagged	Number recaptured	Months at large						
			0-12	12-24	24-36	36-48	48-60	60-72	Unknown
1954	4								
1955	145	1							
1956	413	1	1						
1957	145								
1958	41								
1959	202								
1960	111								
-----									
1961	262	2			1	1			
1962	387	4		2			2		
1963	680	4	2	1	1				
1964	526	12(1)	6(1)	2	3	1			
1965	365	6(2)	3(1)	2(1)	1				
1966	568	11(5)	4(2)	3	1	1(1)	2	(2)	
1967	521	6(1)	1	1(1)	2		2		
-----									
1968	825	19(1)	7	5(1)	5	1	1		
1969	1,399	20(6)	8(2)	7(3)	5(1)				
1970	947	27(2)	9	12(2)	4	1	1		
1971	1,018	17(3)	13(1)	2	1(2)	1			
1972	475	5	2		1				
1973	286	4	1	3					
1974	276	3	2	1					
1975	407								
Unknown	11	19(1)							10(1)
TOTALS	10,816	150(22)	52(7)	41(8)	25(3)	8(1)	7	(2)	10(1)
Total (1961-67 only)	3,249	45(5)	16(3)	11(2)	9	5(1)	4	(2)	

through Sept. 30

Table 7

White marlin returns, by method of recapture and nationality of recapturing vessel

	SPORT	Year of Release	Releases by area <sup>a/</sup>			Returns	
			1	2	3	Number	Year of recapture
British West Indies	Rod and Reel	1					
United States	Rod and Reel	64					
Venezuela	Rod and Reel	7					
<u>COMMERCIAL</u>							
Canada	Longline	3					
Cuba	Longline					1	1969
	"Criollo" line	22					
France	Longline	1					
Japan	Longline	48					
Norway	Longline	2					
South Korea	Longline	8				1	1970
United States	Longline	1					
Venezuela	Longline	15					
Commercial Total		100					
<u>ALL METHODS</u>							
Grand Total		172				1	1975

Table 8. Releases and for broadbill swordfish, *Xiphias gladius*, by years and areas. Releases were by MNOI and NSFPL, from longline (82) and rod and reel (1) catches, and 2 free swimming fish. All recaptures were in release area.

Year of Release	Releases by area <sup>a/</sup>			Returns	
	1	2	3	Number	Year of recapture
1961	3				
1962	1				
1963	1				
1964	6				
1965	4			1	1969
1966	14				
1967	5				
1968	2				
1969	8			1	1970
1970	10	1			
1971	1		1		
1972					
1973					
1974	12	14		1	1975
1975	2				

a/ Release areas: 1. Cape Hatteras - Grand Banks  
2. Gulf of Mexico  
3. Virgin Islands