

# Billfish Bycatch Observer Data of the U.S. Swordfish Longline Fleet, St. Croix, U.S. Virgin Islands - 1988 and 1989

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## ABSTRACT

In 1987 and 1988, U.S. registered swordfish longline vessels landed 247 mt (172 mt swordfish) and 362 mt (250 mt swordfish) of surface longline catch, respectively, on St Croix for air shipment to the United States. The passively fishing, non-discriminatory longline gear also catches billfish other than swordfish (blue marlin, *Makaira nigricans* Lacepede, white marlin, *Tetrapterus albidus* Poey, longbill spearfish, *Istiophorus albicans* Latreille) as bycatch. Absent from weighout sheets and dealer records, the amount of billfish bycatch from swordfish longline vessels is relatively unknown and unavailable, except for onboard observer data.

Two trips were made as observer/crewman onboard a 15 m swordfish longline vessel from St. Croix, comprising fourteen observer days (November 26 - December 1, 1988 and March 12 to March 20, 1989). Based on the total number of fish caught during the two trips, the relative abundance for billfish was 5%. One billfish was caught for every 336 hooks set. Relative abundance values for the fourteen blue marlin, two white marlin and one spearfish caught were 82%, 12% and 0.6%, respectively. Sixty-four percent (nine individuals) of the blue marlin caught were live and released in good condition. An estimated 1,230 billfish in 1987 and 910 billfish in 1988 were caught by the St. Croix-based swordfish fleet.

## INTRODUCTION

Swordfish (*Xiphias gladius* Linnaeus) have been actively pursued by surface longline methods in the tropical Atlantic since the mid-1960's (Guitart-Manday, 1964; 1975). Gear modifications that have occurred through the development of the fishery in the Straits of Florida in 1975 and the Caribbean Sea in 1983 have been discussed by Berkeley *et al.*, (1981) and Tobias (In press). respectively. The surface longline gear passively drifts with the prevailing current catching fish encountered during its period of deployment. As such, the gear is non-discriminatory and the catch is comprised of pelagic fish species including other billfish, tunas and sharks (Berkeley *et al.*, 1981; Wood, 1986; Tobias, 1987).

By 1987, the United States Caribbean swordfish longline fleet had expanded to more than 35 vessels ranging in size from 11-55 m. Ports on St.

Croix, U.S. Virgin Islands, became popular with captains of primarily south Florida vessels 14-17 m in length (Taniguchi, 1987). St. Croix's popularity was due to several important factors. Located 167 km southeast of San Juan, Puerto Rico, St. Croix's proximity to the southern Caribbean fishing grounds saved two days travel time per trip. Air shipment of catch directly to the United States was possible via major air carriers. After some initial problems, the U.S. Food and Drug Administration (FDA) reclassified St. Croix as a U.S. port; therefore, not requiring inspection and detainment of swordfish shipments.

Data collected by Tobias (In press) on the catch composition of stateside fish shipments from St. Croix in 1987 show that billfish other than swordfish do not appear on weighout sheets or dealer records. Due to the non-discriminatory nature of the swordfish longline gear, the amount of gear deployed and the time required for haulback of the gear during daylight hours, it is believed that billfish, such as blue marlin, *Makaira nigricans*, white marlin, *Tetrapturus albidus*, spearfish, *Tetrapturus pfluegeri* and sailfish, *Isiophorus albicans*, may make up a substantial portion of the swordfish longline bycatch. This report presents billfish bycatch data from two observer trips onboard a St. Croix-based swordfish longline vessel. Estimates of billfish bycatch are also made for the 1987 landings of the St. Croix swordfish fleet.

#### METHODS

Data on billfish bycatch were obtained by the author participating as observer/crewman aboard the 15 m swordfish longline vessel "Miss Shannon". Two trips were made, November 26 to December 1, 1988 (six sets) and March 12 to March 20, 1989 (eight sets). Data collected included information on latitude and longitude of set, water temperature, wind speed and direction, wave direction and height, gear length, depth range, hook and floatline length, bait, number of hooks, number of lightsticks, number of floats and catch description. Length (direct) and weight (estimate) measurements were taken for each fish (bycatch and target species) brought onboard and fish sex was determined. The condition of each fish when brought to the vessel was also recorded. Live billfish and other species were tagged and released whenever possible by the vessel's captain.

#### RESULTS AND DISCUSSION

The general area fished by the St. Croix-based U.S. swordfish vessels is shown in Figure 1. A typical set for vessels 14-17 m in length consisted of 50 km of mainline and 420 hooks. Catch composition for the vessel "Miss Shannon" for the November 1988 and March 1989 observer trips are shown in Tables 1 and 2, respectively. A total of 2,352 hooks were set on the six-day trip in November 1988 (Table 1) resulting in the catch of 75 swordfish, 38 tuna, 12 shark, 9 billfish and 36 other non-commercial fish (*i. e.*, bat rays). The relative

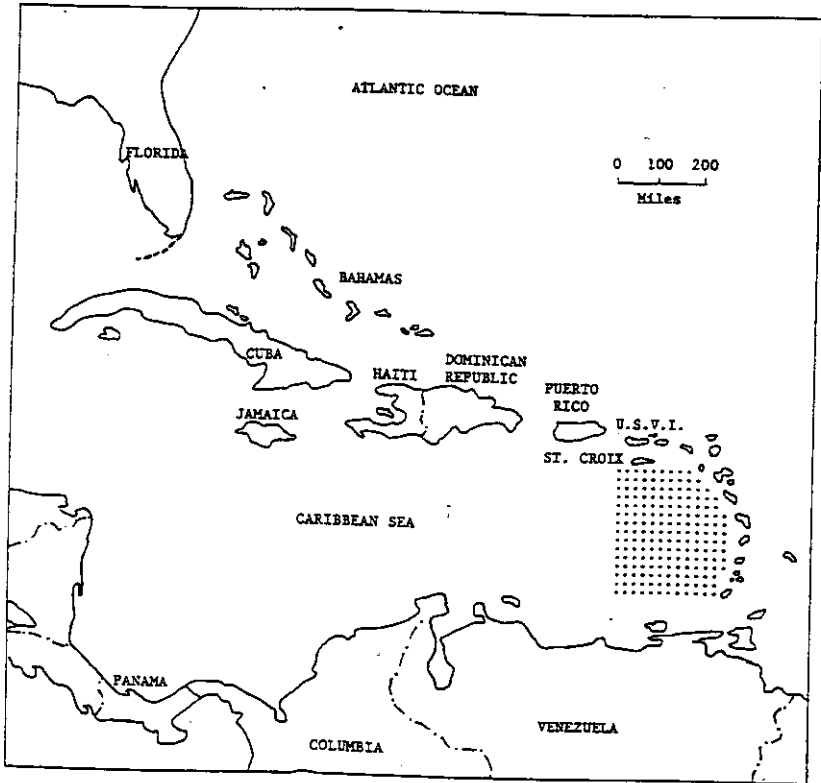


Figure 1. General location of area fished for swordfish by St. Croix-based U. S. swordfish vessels (stippled) (map from Edwards *et al.*, 1989).

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**Table 1.** Catch composition for the vessel "Miss Shannon," November 26 - December 1, 1988.

DATE	#HOOKS SET	SPECIES CAUGHT				
		Swordfish	Tuna	Shark	Billfish	Other
11-26-88	420	9	10	2	4	4
11-27-88	420	16	8	3	0	3
11-28-88	336	14	1	2	0	3
11-29-88	336	10	6	2	1	8
11-30-88	420	15	9	1	3	13
12-01-88	420	11	4	2	1	5
TOTALS: N=6	2,352	75	38	12	9	36
Relative Abundance		0.44	0.22	0.07	0.05	0.22

**Table 2.** Catch composition for the vessel "Miss Shannon," March 13 - 20, 1989.

DATE	#HOOKS SET	SPECIES CAUGHT				
		Swordfish	Tuna	Shark	Billfish	Other
3-13-89	420	15	0	2	2	2
3-14-89	420	13	1	2	1	1
3-15-89	420	7	2	2	1	2
3-16-89	380	11	3	1	0	4
3-17-89	398	19	6	3	0	4
3-18-89	398	9	1	5	1	2
3-19-89	420	18	4	5	2	2
3-20-89	420	13	3	5	1	3
TOTALS: N=8	3,276	105	20	25	8	20
Relative Abundance		0.59	0.11	0.14	0.05	0.11

abundance of species groups in the catch was swordfish, 44%; tuna, 22%; shark, 7%; billfish, 5%; and others 22%. One billfish, other than a swordfish was caught every 261 hooks set.

A total of 3,276 hooks were deployed on the eight-day set of the March 1989 observer trip (Table 2). The catch was comprised of 105 swordfish, 20 tuna, 25 shark, 8 billfish and 20 other fish. The relative abundance of species groups in the catch was swordfish, 59%; tuna, 11%; shark, 14%; billfish, 5%;

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and others, 11%. Based on the total number of hooks deployed, one billfish was caught for every 410 hooks set.

The catch composition and condition of billfish species caught on the November 1988 and March 1989 swordfish longliner observer trips are shown in Table 3. A total of seventeen billfish were caught in fourteen observer days,

**Table 3.** Catch composition and catch condition of billfish species caught on the swordfish longline vessel "Miss Shannon," November 26 - December 1, 1988 and March 13 - 20, 1989.

DATE	BILLFISH SPECIES					
	Blue Marlin		White Marlin		Spearfish	
	live	dead	live	dead	live	dead
11-26-88	3(1*)	1				
11-29-88	1					
11-30-88	1	2				
12-01-88	1*					
03-13-89	1*					
03-14-89		1				1
03-15-89		1				
03-18-89	1*					
03-19-89			1*	1		
03-20-89	1					
TOTALS:	9(4*)	5	1*	1	0	1
Relative Abundance	0.82		0.12		0.06	

\* indicates fish tagged

nine blue marlin during the November 1988 trip and five blue marlin, two white marlin and one spearfish during the March 1989 trip. Of the fourteen blue marlin caught, nine were live and in good condition, representing 64% survival, and five were dead. One of the two white marlin caught was alive and in good condition. The only spearfish caught was hauled in dead. No sailfish were caught. The relative abundance of billfish species was blue marlin, 82%, white marlin, 12% and spearfish 6%.

The amount of billfish bycatch caught on swordfish longline vessels will vary greatly depending on the fishing location, fishing experience of the captain, fishing season, amount of time the gear fishes during the day, lunar phase, meteorological conditions and ocean current patterns. Wood (1986) reported fourteen blue marlin, one white marlin and two sailfish caught in 78 longline

sets from October 1984 to December 1985 with a relative abundance of 5%, 0.4% and 0.7%, respectively, in regard to the entire catch. This accounts for one billfish for every 294 hooks set. Fifty percent of the blue marlin were live and released. Both the white marlin and two sailfish caught were boated dead.

In 1987 and 1988, U.S. swordfish vessels landed 247 mt (172 mt swordfish) and 362 mt (250 mt swordfish) of surface longline catch, respectively, on St. Croix for air shipment to the United States (Tobias, 1987). Assuming that the observer data presented in this paper are representative of average catch composition of longline vessels fishing out of St. Croix, it is possible to make the following calculations to estimate the impact of the St. Croix swordfish fleet on the billfish population in the eastern Caribbean.

In 1987, 18 vessels landed catch on St. Croix from 123 swordfish longline trips.

Assuming:

- 123 trips x 8 days/trip = 984 fishing days
- 984 fishing days x 420 hooks/day = 413, 280 hooks set
- 413, 280 hooks set x one billfish/336 hooks set = 1, 230 billfish caught  
(261 + 410/2)

Therefore:

- 1, 230 billfish x 0.82 relative abundance for blue marlin = 1,009 blue marlin
- 1,230 billfish x 0.12 relative abundance for white marlin = 148 white marlin
- 1, 230 billfish x 0.06 relative abundance for spearfish = 74 spearfish
- 1, 230 billfish x 0.004 relative abundance for sailfish = 5 sailfish

In 1988, nineteen vessels landed catch on St. Croix from 91 swordfish longline trips.

Assuming:

- 91 trips x 8 days/trip = 728 fishing days
- 728 fishing days x 420 hooks/day = 305, 760 hooks set
- 305, 760 hooks set x one billfish/366 hooks = 910 billfish

Therefore:

- 910 billfish x 0.82 relative abundance for blue marlin = 746 blue marlin
- 910 billfish x 0.12 relative abundance for white marlin = 109 white marlin
- 910 billfish x 0.06 relative abundance for spearfish = 55 spearfish
- 910 billfish x 0.004 relative abundance for sailfish = 4 sailfish

Assuming a survival rate of 50-76% for blue marlin caught on longline gear (Wood, 1986; CFMC, 1987; Edwards *et al.*, 1989), an estimated 505-767 blue marlin caught in 1987 and 373-567 blue marlin caught in 1988 would have been

released live. The lack of adequate observer data on white marlin, spearfish and sailfish caught on longline gear preclude making survival rate determinations for these billfish species.

Data presented by Brandon (1985) show that waters adjacent to the U.S. Virgin Islands are some of the most productive in the world for blue marlin. As a result, the recreational billfish fishery annually contributes more than five million dollars into the U.S. Virgin Islands economy. The potential for conflict between recreational and commercial fishermen has been decreased with the deployment of a Billfish Management Plan directed at preserving the resource for the recreational fishery (CFMC, 1987). However, at present, a sufficient database does not exist on billfish bycatch to determine if these management measures are sufficient to maintain the fishery. As an example, observer data presented in this paper represents less than one percent of the fishing days of the swordfish vessels on St Croix for the combined 1987 and 1988 years. To fully understand the impact of the Caribbean swordfish longline fishery in terms of bycatch on billfish populations and to provide accurate baseline data for resource managers, an observer program should be developed to encompass annual data collection of the Caribbean swordfish longline fishery.

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