

# The Japanese Longline Fishery in the Gulf of Mexico, 1978

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## Introduction

The Fishery Conservation and Management Act of 1976 (FCMA), Public Law 94-265, provides for the conservation and management of fishery resources of the United States by establishing a fishery conservation zone (FCZ) of 200 nautical miles. This law allows the United States to manage all marine resources within these waters with the exception of highly migratory fishes, such as the tunas.

Since the United States has an interest in billfishes and sharks as a recreational fishery, formal management plans have been developed for such species. Under the authority of the FCMA, a preliminary management plan (PMP) for Atlantic billfishes and sharks was prepared by the National Marine Fisheries Service and implemented on 20 March 1978. Basically, the PMP requires that all foreign vessels fishing within the FCZ obtain a permit, maintain logs recording amount and location of catch, release all billfishes and sharks whether dead or alive, and allow boarding and observation of fishing activities by U.S. observers.

The first boarding was conducted on 28 February 1978, aboard the Japanese vessel *Masa Maru #28* in the northern Gulf of Mexico. For the 1978 fishing season in the Gulf of Mexico, 21 boardings were made and 167 fishing days monitored. All boardings were on Japanese longliners fishing in the northern Gulf of Mexico for bluefin and yellowfin tuna (Fig. 1). Observers were responsible for recording the amount and identifying the species of fish caught. They were also responsible for

determining whether the fish were dead or alive when brought alongside, with emphasis being on billfishes, for tagging and releasing all live billfish, and for collecting biological samples from tunas with the permission and cooperation of the Japanese.

This paper describes the general fishing operation of Japanese longline vessels, and provides information on the incidental catch of all species including billfishes and sharks.

## Vessel Description

The typical Japanese longline fishing vessel operating in the Gulf of Mexico ranges from 50 to 70 m in length and is well equipped with radio and navigational equipment (Fig. 2). Hold capacity ranges from 300 to 500 metric tons (t) of frozen fish and the vessels usually stay at sea until the fish holds are filled. This normally takes from 9 to 10 months depending on fishing success. Freezing facilities consist of a cooling room, a flash freezing room, and three or more storage freezers, with temperatures of approximately  $-20^{\circ}$ ,  $-70^{\circ}$ , and  $-50^{\circ}\text{C}$ , respectively. The number of crew members is generally 21-25 and only 2 or 3 do not actively participate in fishing operations.

The longline is set from the stern of the vessel and haulback and fish processing takes place on the forward quarterdeck. Conveyor belts are used to transport fishing gear between these areas.

## Fishing Gear Description

The longline used by Japanese tuna vessels in the Gulf of Mexico consists of a main line suspended horizontally from the surface by floats and a series of branch lines (gangions) with baited

hooks suspended from the main line. The main line is frequently as long as 135 km and is stored on the vessel by one of two methods: A single large continuous spool (Fig. 3) or four large (2 m  $\times$  2 m  $\times$  3 m) storage bins. The bins are preferred by some vessel operators because they are apparently less dangerous, not requiring brakes to overcome the momentum of a large spool.

A gangion or branch line consists of four separate sections connected by swivels and splices (Fig. 4). The first section (connected to the main line) is approximately 12 m long, the second section  $\approx$  0.1 m, and a third section 10 m long is connected to the final segment, a 4-m braided steel leader. The hooks vary in size according to the target species, with the larger hooks used for bluefin and the smaller hooks for yellowfin tuna.

The float lines used to suspend the main line range in length from 10 to 30 m. The floats are approximately 45 cm in diameter and made of blown glass or plastic. Fluorescent reflectors are used on some floats so they can be easily seen at night. A series of radar, light, and flag buoys are also connected to the main line for ease in locating direction and position of the main line. Figure 5 shows the positioning of radar and light buoys in a typical longline set.

The Automatic Reeling and Paying (ARP) apparatus (Fig. 6) is used in both the haulback and setting operation and each vessel is equipped with two ARP's one on the bow and one on the stern. The one on the bow is used to pull the main line from the water and coil it onto the forward conveyor belt. The stern ARP apparatus pulls the main line from either the large drum spool or the line holding bins located at the stern.

Bait usually consists of mackerel or saury approximately 25 cm in length and/or squid of about the same size.

## Setting the Gear

The longline is set from the stern of the vessel at a speed of approximately 10 kn, beginning generally between

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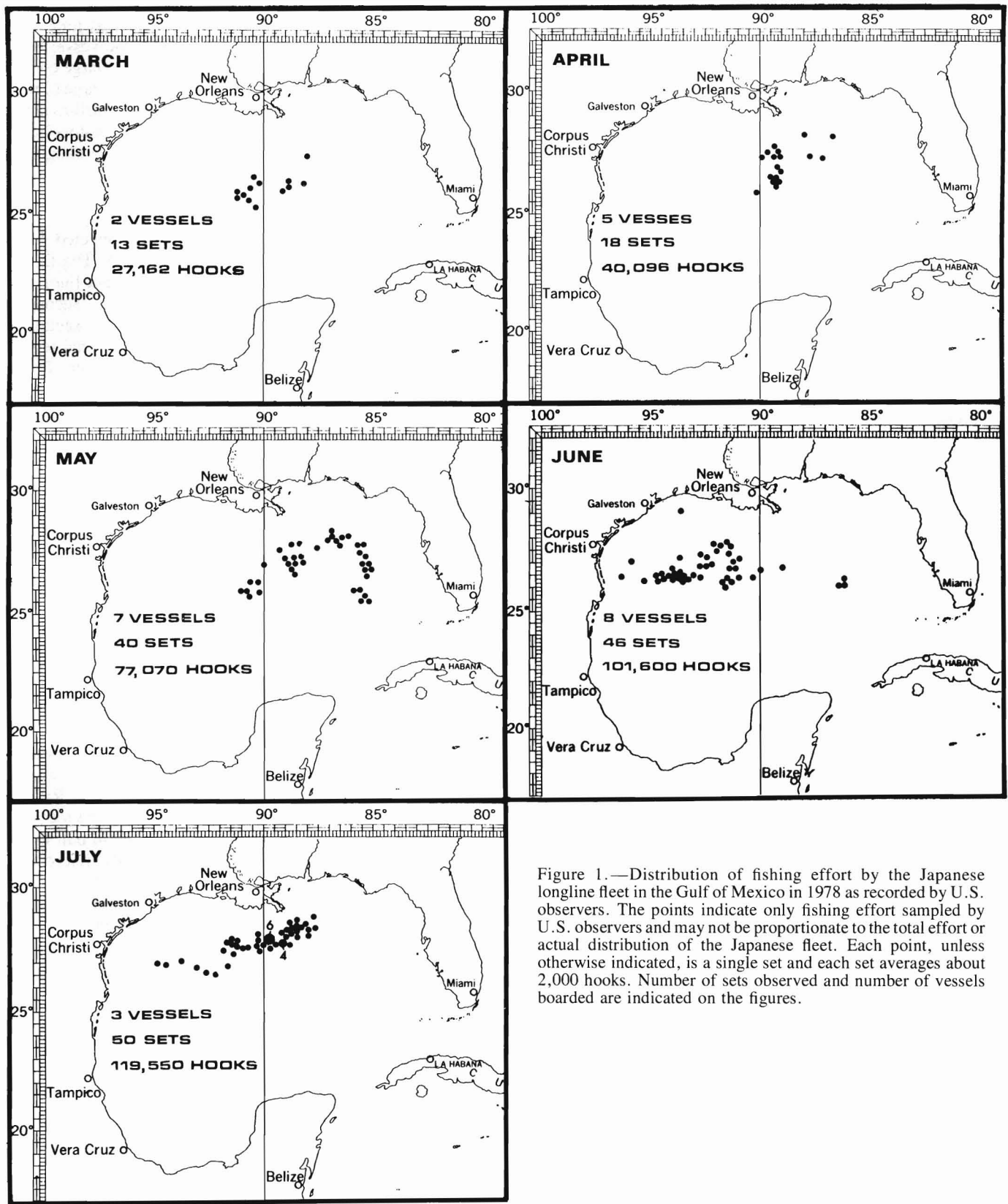


Figure 1.—Distribution of fishing effort by the Japanese longline fleet in the Gulf of Mexico in 1978 as recorded by U.S. observers. The points indicate only fishing effort sampled by U.S. observers and may not be proportionate to the total effort or actual distribution of the Japanese fleet. Each point, unless otherwise indicated, is a single set and each set averages about 2,000 hooks. Number of sets observed and number of vessels boarded are indicated on the figures.



Figure 2.—Typical Japanese longline vessel.

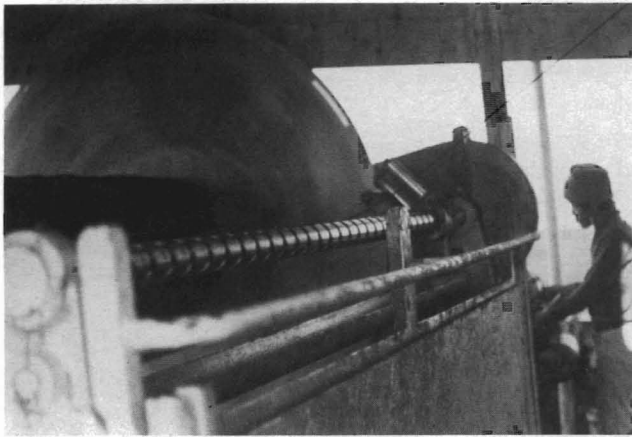


Figure 3.—Large metal spool used by Japanese longline vessels for storing the main line.

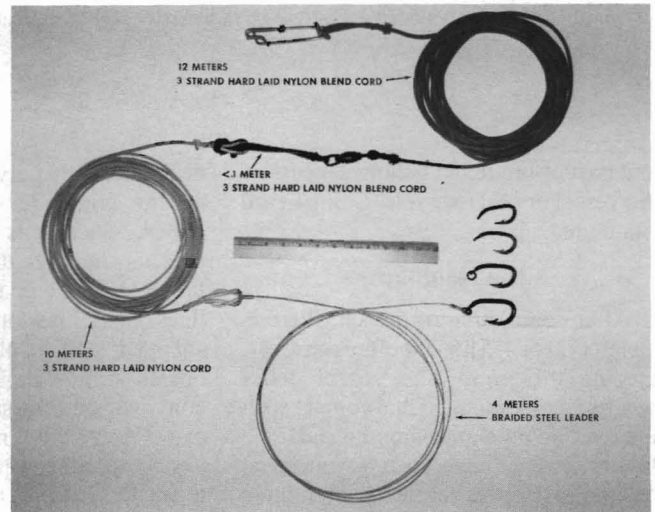


Figure 4.—Typical gangion used on Japanese longline as observed by one U.S. observer. Larger hooks are used for bluefin tuna while smaller hooks are used for yellowfin tuna.

2400 and 0200 hours and completed between 0800 and 1000 hours. There is a great deal of variation between vessels due to past or predicted fishing techniques and conditions. The number of hooks fished per set for bluefin tuna ranges from 1,923 to 2,228. Three to four gangions were spaced between floats. When fishing for yellowfin tuna, the number of hooks per set ranged

from 2,283 to 2,391 and 4 to 5 hooks were fished between floats.

Five men are involved in setting the fishing gear. The main line passes through guides from the storage area to the ARP apparatus at the stern. One crewman uncoils the gangion or float line and hands the longline clip to a second crewman who attaches it to the main line. A third crewman then places

the bait on the hook and throws the entire gangion or float overboard. The two remaining crewmen ready the bait, arrange gangions and floats on the aft conveyor belt, so the setting operation is continuous, and prepare light and radar buoys (Fig. 7). Some factors seemingly affecting the position and direction of the set were the surface temperature of the water, current direction,

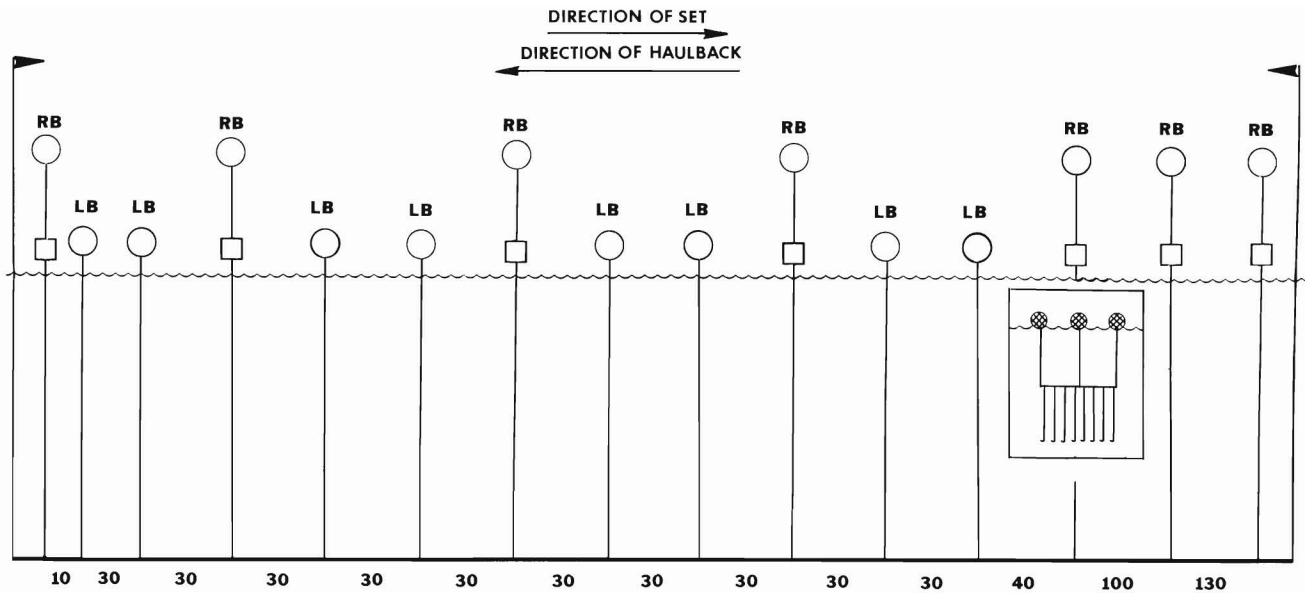


Figure 5.—Placement of radio (RB) and light (LB) buoys on a Japanese longline as observed by one U.S. observer aboard a Japanese longline vessel fishing in the Gulf of Mexico in 1978. Insert shows the placement of gangions between each float for this vessel. The number of floats between each light or radio buoy is indicated at the bottom. Directions of set and haulback are indicated also.

and past or predicted fishing success of the vessel or other vessels fishing in the same area.

### The Haulback

After completion of the set, there is an interval of 4-5 hours before retrieval. During this time, the vessel drifts nearby, maintaining visual contact with the red flag buoy marking the end. The last hook put out is usually retrieved first, allowing the beginning of the line to fish the longest. In a few cases, however, depending on how fishing was the day before and how the line was set, the vessel steams to the beginning of the longline and begins the retrieve. In most cases, the haulback begins around noon, lasts for approximately 12 hours, and involves 10-12 crew members.

Once the red flag buoy is on board, the main line is immediately put on the forward ARP apparatus, and the vessel moves ahead about 4-6 kn parallel to the line. As the main line is retrieved by the ARP apparatus, it is coiled on the forward conveyor belt. From the conveyor belt, the line moves through a trough of seawater for rinsing, through metal separation guides on the fishing

deck, through polyvinyl chloride pipe on the port side, and finally onto a coiler, which coils the line into storage bins, or the large drum spool. Also, as the main line is retrieved, the float lines, buoy lines, and gangions are un-snapped, coiled, placed in plastic tubs or tied in bundles, and carried aft on a conveyor belt for storage (Fig. 8). Because every crew member knows how to operate all equipment, they are able to set up a rotation throughout the haulback.

As soon as the haulback begins, or just before, the crew which set the line that night has freezer duty. This entails going into the flash freezer and removing frozen quarter fillets of bluefin and whole yellowfin tuna from the racks and putting them into the appropriate freezer compartment. Usually the fillets or whole tuna are kept in the flash freezer for 36-48 hours. This procedure is done every day to make room for that day's catch.

When a giant bluefin tuna is caught, the gangion is un-snapped from the main line and immediately attached to a safety line. Two or more men put a strain on the line as the boat stops or

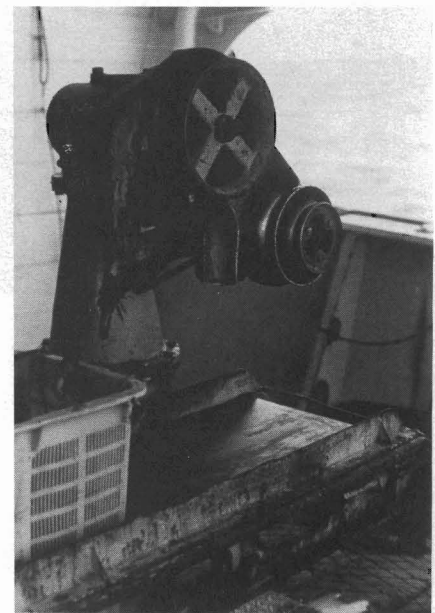


Figure 6.—Automatic reeling and paying apparatus. Device is used for hauling and setting the longline gear onboard Japanese longline vessels.

slows down. After handlining the tuna to the fish door, the bluefin is harpooned in the head if still alive and either tail



Figure 7.—Crewmen of a Japanese longline fishing vessel assembling gear during a set from the stern of the vessel.

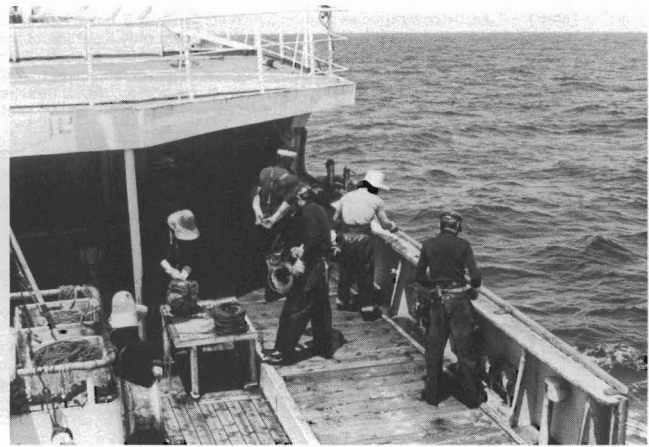


Figure 8.—Crewmen on the fishing deck of a Japanese longline vessel disassembling the main line during a haul-back.

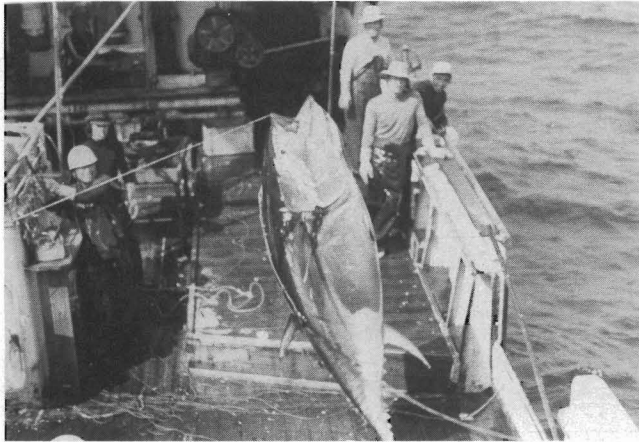


Figure 9.—Giant bluefin tuna being winched aboard a Japanese longline vessel in the Gulf of Mexico.



Figure 10.—Japanese longline crewmen filleting a giant bluefin tuna.

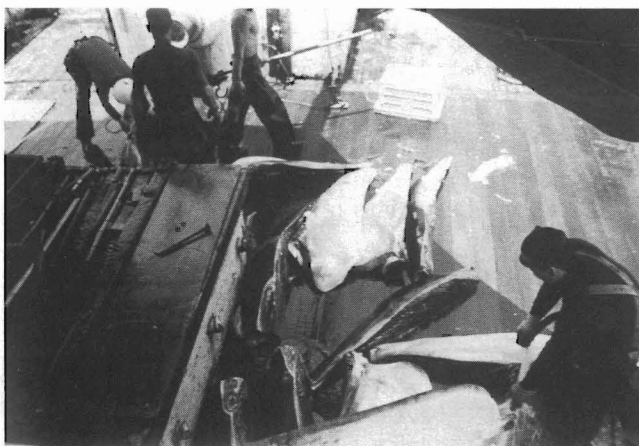


Figure 11.—Fillets of giant bluefin tuna being processed and prepared for going into flash freezer.

roped or gaffed and winched aboard (Fig. 9). All live giant bluefin tuna are harpooned to minimize the risk of losing the fish. For smaller fish, the vessel usually does not stop because the men are able to pull these fish in easily. Once on board, the giant bluefin tuna are filleted and divided into quarters (Fig. 10, 11). Each quarter fillet is trimmed of excess fatty and intermuscular tissue, placed on a wooden pallet, and taken into the flash freezer. On some vessels, two fillets from the same side of the fish are weighed and recorded on log sheets. Occasionally, the fillets are wrapped in plastic before being placed in the freezer. From boarding to freezer, the process takes no more than

**Table 1.—Total catch by species by month as recorded by U.S. observers aboard Japanese longline vessels in the Gulf of Mexico in 1978. These numbers represent only a portion of the total catch by the Japanese longline fishery. BM=blue marlin; WM=white marlin; SF=sailfish; SP=spearfish; SW=swordfish; BF=bluefin tuna; YF=yellowfin tuna; OT=bigeye, skipjack, albacore, blackfin, and unidentified species; SH=silky, blacktip, whitetip, dusky, blue, tiger, hammerhead, mako, thresher, porbeagle, brown, and unidentified sharks; OF=dolphin, wahoo, king mackerel, lancetfish, oilfish, sunfish, opah, stingray, and other species.**

Month	Unidentified billfish	BM	WM	SF	SP	SW	BF	YF	OT	SH	OF	Turtles	Total
March	0	1	4	0	0	22	79	29	6	12	18		171
April	0	3	4	1	3	13	257	21	3	71	25		401
May	0	11	28	21	2	30	309	64	0	142	126		733
June	3	34	226	30	13	59	49	1,451	56	160	359	2	2,442
July 1-17	9	60	535	66	74	88	1	2,498	276	253	626	4	4,490
Total	12	109	797	118	92	212	695	4,063	341	638	1,154	6	8,237

**Table 2.—Number of sets and total number of hooks set by month by Japanese longline vessels recorded by U.S. observers. These numbers only represent a portion of the Japanese longline fishing effort in the Gulf of Mexico.**

Month	Sets	Hooks
March	13	27,162
April	18	40,096
May	40	77,070
June	46	101,600
July 1-17	50	119,550
Total	167	365,478

**Table 3.—Percentage of total catch by species by month of fishes caught by Japanese longline vessels as recorded by U.S. observers. These numbers do not represent the total catch by Japanese longline vessels in the Gulf of Mexico in 1978. See Table 1 for column definitions.**

Month	Unidentified billfish	BM	WM	SF	SP	SW	BF	YF	OT	SH	OF	Turtles
March	0	0.58	2.34	0	0	12.86	46.20	16.96	3.51	7.02	10.53	0
April	0	0.74	1.00	0.25	0.75	3.24	64.90	5.24	0.75	17.71	6.23	0
May	0	1.50	3.82	2.86	0.27	4.09	42.15	8.73	0	19.37	17.19	0
June	0.12	1.39	9.25	1.23	0.53	2.42	2.01	59.42	2.29	6.55	14.70	0.08
July 1-17	0.20	1.34	11.91	1.47	1.65	1.96	0.02	55.63	6.15	5.63	13.94	0.09
Mean	0.15	1.32	9.68	1.43	1.12	2.57	8.44	49.33	4.14	7.75	14.01	0.07

**Table 4.—Live (L), dead (D), and percent mortality (%M) by species by month of fishes caught by Japanese longline vessels in the Gulf of Mexico during 1978. These numbers represent only catch as observed by U.S. observers. This is not the total catch of the Japanese longline fishery.**

Month	Blue marlin			White marlin			Swordfish			Sailfish			Spearfish			Unidentified billfish			Sharks			Other		
	L	D	%M	L	D	%M	L	D	%M	L	D	%M	L	D	%M	L	D	%M	L	D	%M	L	D	%M
March	1	0	0%	4	0	0%	8	14	64%	0	0	0%	0	0	0%	0	0	0%	8	4	33%	66	66	50%
April	0	3	100%	3	1	25%	3	10	77%	1	0	0%	1	2	67%	0	0	0%	57	14	20%	70	46	40%
May	10	1	9%	20	8	29%	11	19	63%	6	15	71%	0	2	100%	0	0	0%	123	19	13%	177	322	64%
June	24	10	29%	102	124	55%	14	45	76%	19	11	37%	5	8	61%	1	2	67%	138	22	14%	572	1,343	70%
July 1-17	18	42	70%	203	332	62%	21	67	76%	30	36	54%	20	54	73%	7	2	22%	210	43	17%	792	2,609	77%
Total	53	56	51%	332	465	58%	57	155	73%	56	62	52%	26	66	72%	8	4	33%	536	102	16%	1,677	4,368	72%

7 minutes. Other tunas are processed differently. Instead of filleting, these fish are gutted, fins and tails cut off, and gills and gill plates removed. The body cavity and outside of the fish are cleaned and washed down with a scrub brush before freezing.

### Catch Composition

During the 1978 longline season in the Gulf of Mexico, the vessels observed captured a total of 8,237 fish and 6 turtles (Table 1). The target species

from 1 March to 1 June was bluefin tuna; yellowfin tuna was the target species from 1 June to 17 July. From 1 March to 17 July, 167 sets of longline gear were monitored totaling 365,478 hooks (Table 2). The composition of the catch changed significantly during the season (Table 3). This change was not only between the target species (bluefin from 1 March to 1 June, yellowfin from 1 June to 17 July), but among the incidental catch as well. The catch of blue marlin and white marlin, for example, was low early in the sea-

son, but increased significantly as the season extended into the summer months (Table 4).

### Acknowledgments

The collection of biological samples from bluefin tuna was accomplished through the cooperation of the Japanese fishing companies. We gratefully acknowledge their assistance, and we appreciate the courtesies extended to us by the various fishing vessels. The authors thank Grant L. Beardsley for his direction in writing this paper.