NOAA Technical Memorandum NMFS-SEFC-64

JAPANESE LONGLINE FISHING: Comparisons Between Observer Data and Japanese Quarterly Reports for 1979 in the Atlantic and Gulf of Mexico

Perry A. Thompson, Jr.

February 1982

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Southeast Fisheries Center
Mississippi Laboratories
Pascagoula Facility
P. O. Drawer 1207
Pascagoula, MS 39567

NOAA Technical Memorandum NMFS-SEFC-64

This Technical Memorandum (TM) series is used for documentation and timely communication of preliminary results, interim reports, or similar special purpose information. Although the memos are not subject to complete formal review, editorial control, or detailed editing, they are expected to reflect sound professional work.

JAPANESE LONGLINE FISHING: Comparisons Between Observer Data and Japanese Quarterly Reports for 1979 in the Atlantic and Gulf of Mexico

Perry A. Thompson, Jr.

February 1982

U.S. DEPARTMENT OF COMMERCE
Malcolm Baldrige, Secretary
National Oceanic and Atmospheric Administration
John Byrne, Administrator
National Marine Fisheries Service
William G. Gordon, Assistant Administrator for Fisheries

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

TABLE OF CONTENTS (Continued)

LIST OF ILLUSTRATIONS (Continued)

LIST OF TABLES

TABLE OF CONTENTS (Continued)

LIST OF TABLES (Continued)

SECTION 1.0

INTRODUCTION

1.1 FISHERY CONSERVATION AND MANAGEMENT ACT OF 1976

In March 1977, Congress signed into law the Fishery Conservation and Management Act (FCMA), PL 94-265, of 1976. This Act provides exclusive United States management authority over all fishery resources of the continental shelf adjacent to the United States. In addition, the Act established the Fishery Conservation Zone (FCZ), which is a zone contiguous to the territorial sea of the United States, extending from the baseline for measuring the territorial sea seaward for 200 nautical miles (Figure 1).

Tunas are not managed under the FCMA because they are highly migratory; however, since the Japanese longline tuna fishery does take other species incidental to tuna (e.g., billfishes and sharks), and these species are subject to management, the fishery must satisfy certain requirements of the FCMA.

The Act explicitly provides that authorized United States observers be permitted on board any foreign fishing vessel which is fishing for, or is incidentally catching, any fish over which the United States has exclusive management jurisdiction.

1.2 SOUTHEAST FISHERIES CENTER FOREIGN FISHERIES OBSERVER PROJECT

Implementation of FCMA and the Atlantic Billfish and Shark Preliminary Fishery Management Plan mandated the need for observers to monitor billfishes and sharks hooked incidentally by Japanese longline vessels fishing in a directed fishery for tuna throughout FCZ waters. Responsibility for project management was assigned to the Pascagoula Laboratory (now part of the Mississippi Laboratories, Southeast Fisheries Center (SEFC)) and the project was named SEFC Foreign Fishery Observer Project.

The SEFC responsibility normally would include only FCZ zones 11 to 15 (Figure 1); however, to achieve continuity of coverage, SEFC observer responsibilities were extended to include zones 16 and 17. These zones represent the continuation of the Japanese longline fishery into waters of the northeastern United States.

Objectives of the SEFC Observer Project are to:

Collect scientific data from foreign fishing vessels in the Atlantic, Gulf of Mexico and Caribbean FCZ;

Monitor foreign fishing activities in the FCZ (for scientific purposes);

Provide information on fishing and biological data on species caught; and

Collect data for analysis of compliance by National Marine Fisheries Services (NMFS) enforcement personnel.

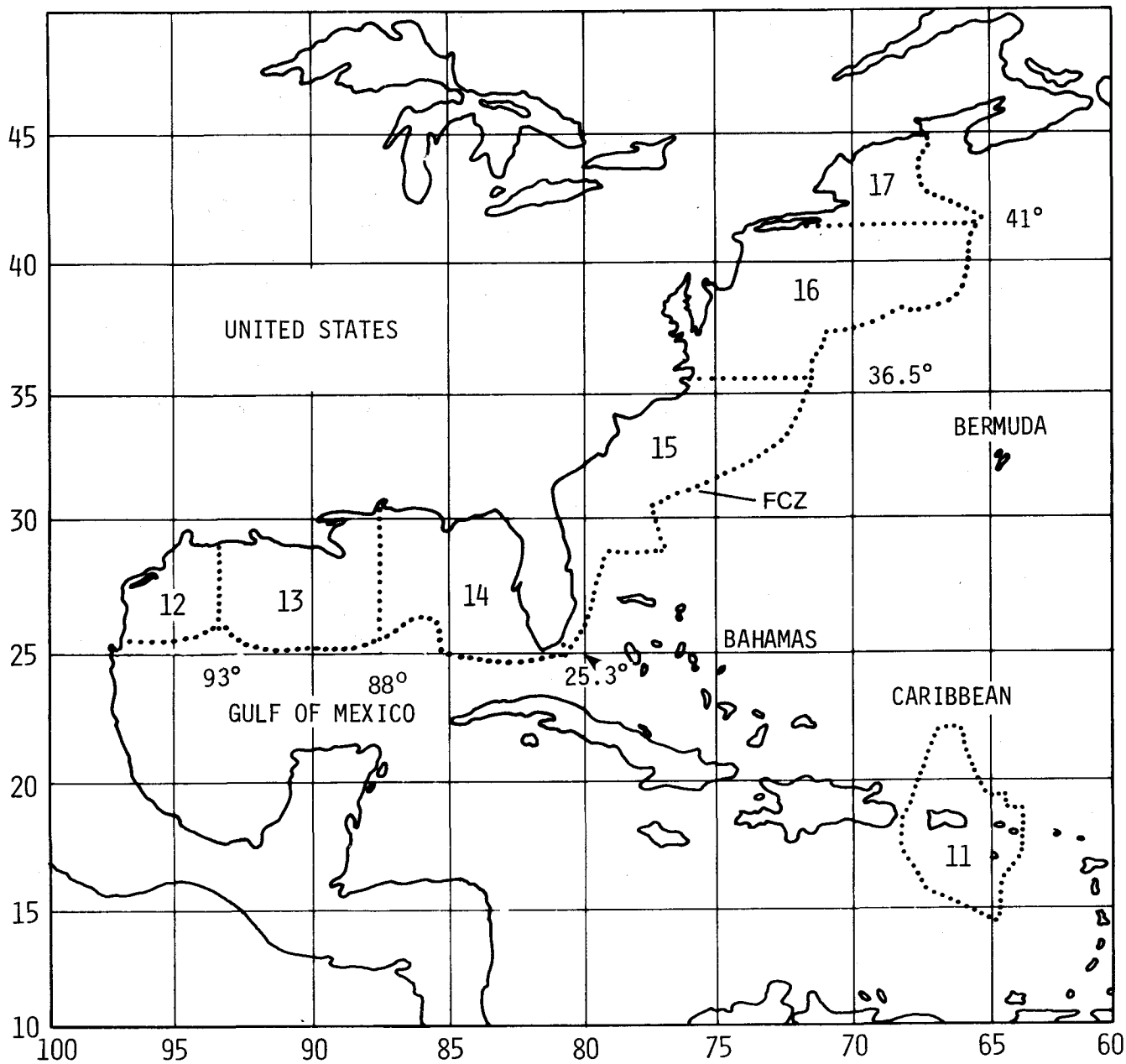


Figure 1. United States Fishery Conservation Zone (FCZ) divided into seven fishery zones.

1.3 PURPOSE

This 1979 statistical report has several purposes:

To evaluate the data provided by the Japanese in their required quarterly reports;

- To present summarized observer and Japanese quarterly report data for 1979;
- To describe reporting procedures and data collected;
- To provide specific recommendations for future reporting requirements by the Japanese; and

To provide generalized recommendations concerning U.S. Coast Guard and NMFS monitoring and support needs.

SECTION 2.0

METHODS

2.1 OBSERVER VESSEL SCHEDULES

Japanese longline tuna vessels entering the United States FCZ are required to notify the U.S. Coast Guard 24 hours prior to commencing fishing operations. This 24-hour notice, however, is insufficient lead time to solve logistical problems associated with deploying foreign fishery observers on Japanese vessels. Therefore, to ensure timely deployment of SEFC observers, the Japanese are requested to provide advance fishing plans which include the Atlantic and Gulf of Mexico FCZ. These plans must include the number of vessels and approximate FCZ entering dates.

When the fishing plans are received, observer deployments are scheduled and coordinated with the Federation of Japan Tuna Fisheries through the Sumar Shipping Agency located in New York, New York. Vessel schedules normally require that each observer rotate through four to five vessels at weekly intervals during a deployment trip. Schedules often change due to weather conditions (too severe to transfer observers), location of the next vessel in rotation, vessels departing FCZ for supplies or because catch capacity has been reached. All observer vessel schedule changes require project approval.

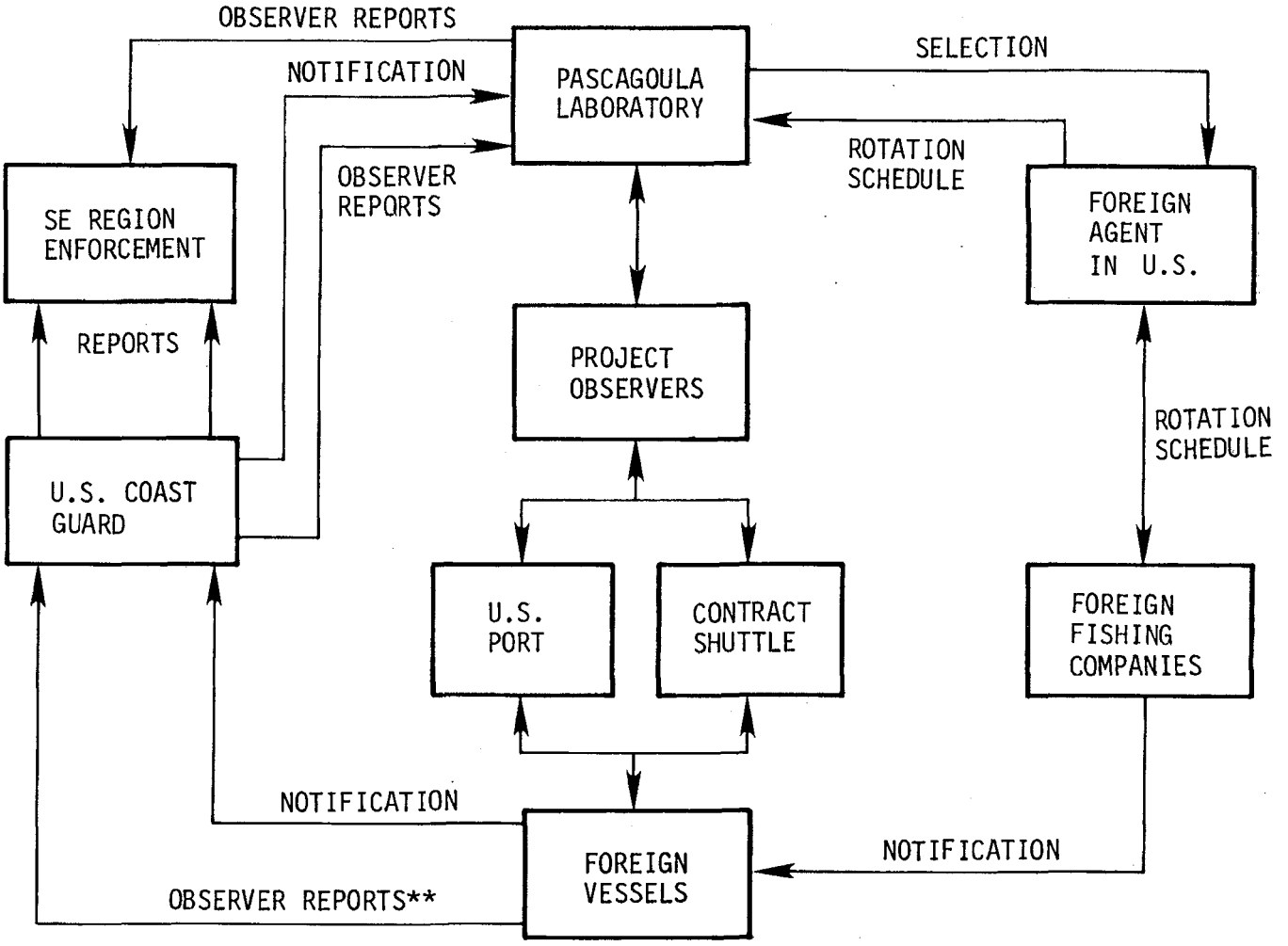
Observers embark on the vessels at designated port locations or port entrance sea buoys. Charter vessels are used when observers are deployed at sea buoys. Observers disembark in the same manner either in port or at sea buoys and schedules are arranged in advance through the Sumar Shipping Agency.

Scheduling of observers aboard Japanese longline vessels generally follows the flow of events shown in Figure 2.

2.2 OBSERVED VESSELS

Since vessel schedules for the observers depend to some extent on information provided by the Japanese, a test was performed to determine if observer coverage was biased toward smaller vessels of the fishing fleet. The assumption was fishing by smaller vessels might be less efficient than by the larger ones. The test was performed by comparing mean vessel ton days in the FZC for the entire fleet against mean observer vessel ton days. Ton days were computed by multiplying the days spent by a vessel in the FCZ by the gross weight of the vessel. Observer vessel ton days were computed in a similar manner by multiplying the weight of the vessel by the number of days observers were aboard that vessel. The test indicated that observers were placed on the larger vessels (mean of 390.1 ton days for observer vessels versus the fleet average of 382.7 ton days). This difference was significant at the 95 percent confidence level and may indicate a tendency of the Japanese to place observers on the larger vessels which have more space.

A second test was conducted to determine if the vessels which effected the most fishing pressure in the FCZ also received the most observer coverage. This



*NORMALLY NO MORE THAN ONE WEEK PER VESSEL AND FOUR CONSECUTIVE WEEKS PER OBSERVER IS SCHEDULED

**RADIO REPORTS SENT EVERY THREE DAYS

Figure 2. Scheduling events for placing observers on foreign vessels.

test was performed by regressing observer days on a vessel against the total number of days spent by the vessel in the FCZ (Figure 3). Test results showed observer coverage was generally in proportion to the amount of time a vessel spent in the FCZ.

2.3 DISTRIBUTION OF OBSERVER COVERAGE

The Japanese longline fleet generally fishes the Atlantic FCZ from June to January and the Gulf of Mexico from January to April, following the changes in distribution and availability of tuna. A review of the distribution of quarterly fishing effort by the Japanese fleet in 1979 (noon-day reports) and observer coverage of that effort indicated tha the total geographical range was adequately covered, with the exception of the second quarter in the Atlantic (Figures 4 through 7). The observer project was unable to provide observer coverage of the longline fleet during the latter period due to logistical problems with the Japanese in deploying observers.

In the Atlantic, some observer coverage and Japanese fishing effort appeared to be outside the FCZ. A probable explanation for the Japanese reported positions being outside the FCZ is the manner in which positions are recorded. Positions are recorded according to 1 degree squares. The longline vessel may fish anywhere within the square, but fishing effort is recorded only in whole degrees from the southeast corner of the square. In other words, longline vessels fishing just inside the FCZ may report their positions outside the FCZ if the southeast corner of the square is outside the FCZ. Observer fishing effort positions are recorded from the beginning of haulback in degrees and minutes. In Figures 4, 6, and 7, observer coverage extends outside the Atlantic FCZ. The outside coverage is due to sets started inside the FCZ which drifted outside. Data from these sets were used in the data evaluation.

2.4 OBSERVERS' SHIPBOARD DUTIES

The primary duty of an observer while aboard a foreign fishing vessel is to collect scientific data (catch rates, catch composition, and biological data) on target and other species. Data requirements are derived from diverse sources; e.g., SEFC Programs, other NMFS Programs, and Fishery Management Councils. Secondary duties include marine mammal and sea turtle observations, collection of data on gear design and fishing tactics, and collection of selected environmental data. Also, another responsibility of the observer is to collect data specifically for compliance analysis by NMFS enforcement personnel. Observers, however, have no authority or responsibility for law enforcement or compliance related activities while aboard foreign fishing vessels.

2.5 OBSERVER DATA

The observer's primary responsibility is to collect catch effort data on billfishes, sharks and other prohibited species hooked by Japanese longline gear. Longline gear basically consists of a number of floats supporting a mainline below the water surface on which gangions or hooks are attached (Figure 8). Longline gear is normally set out from about 0200 hours to 0700 hours in the Gulf of Mexico and from about 0300 hours to 0700 hours in the Atlantic. The haulback of the gear may last from about 1100 hours to 2300 hours in both the Gulf of Mexico and the Atlantic. During haulback time, observers are instructed to be on duty to collect scientific data.

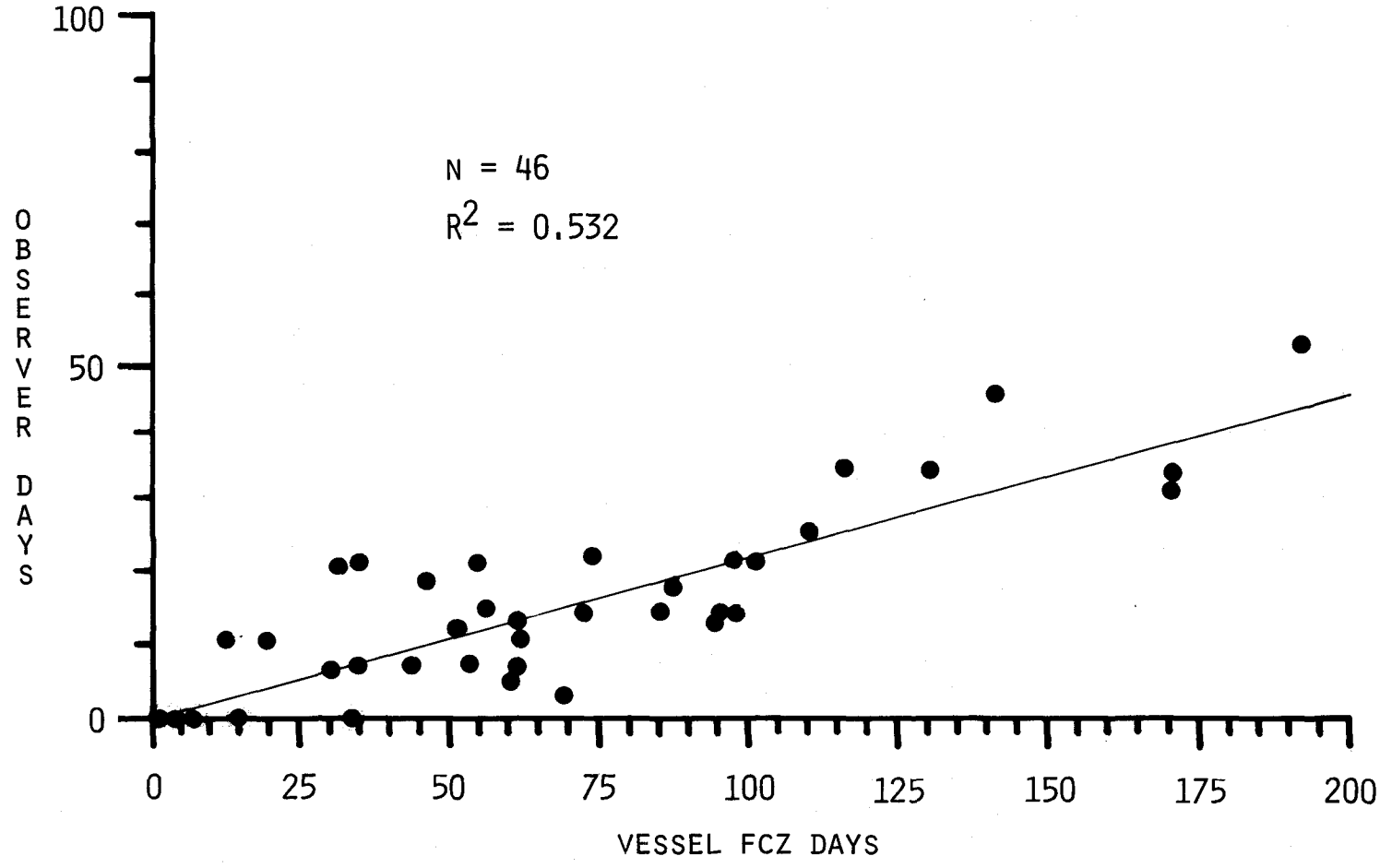


Figure 3 - Relationship between observer coverage days and Japanese vessel days in FCZ.

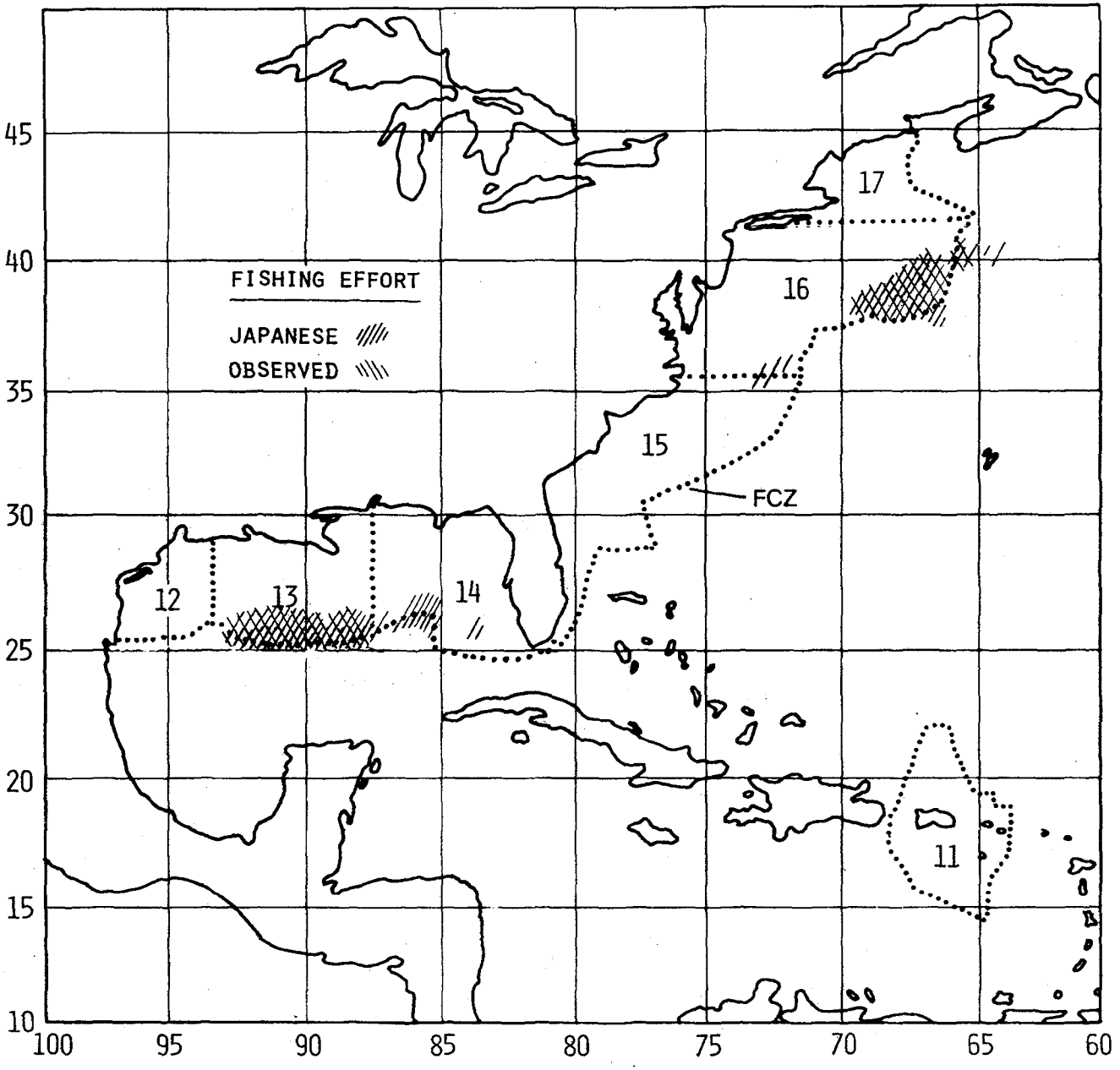


Figure 4. Japanese fishing effort and observer coverage for the first quarter, January to March, of 1979.

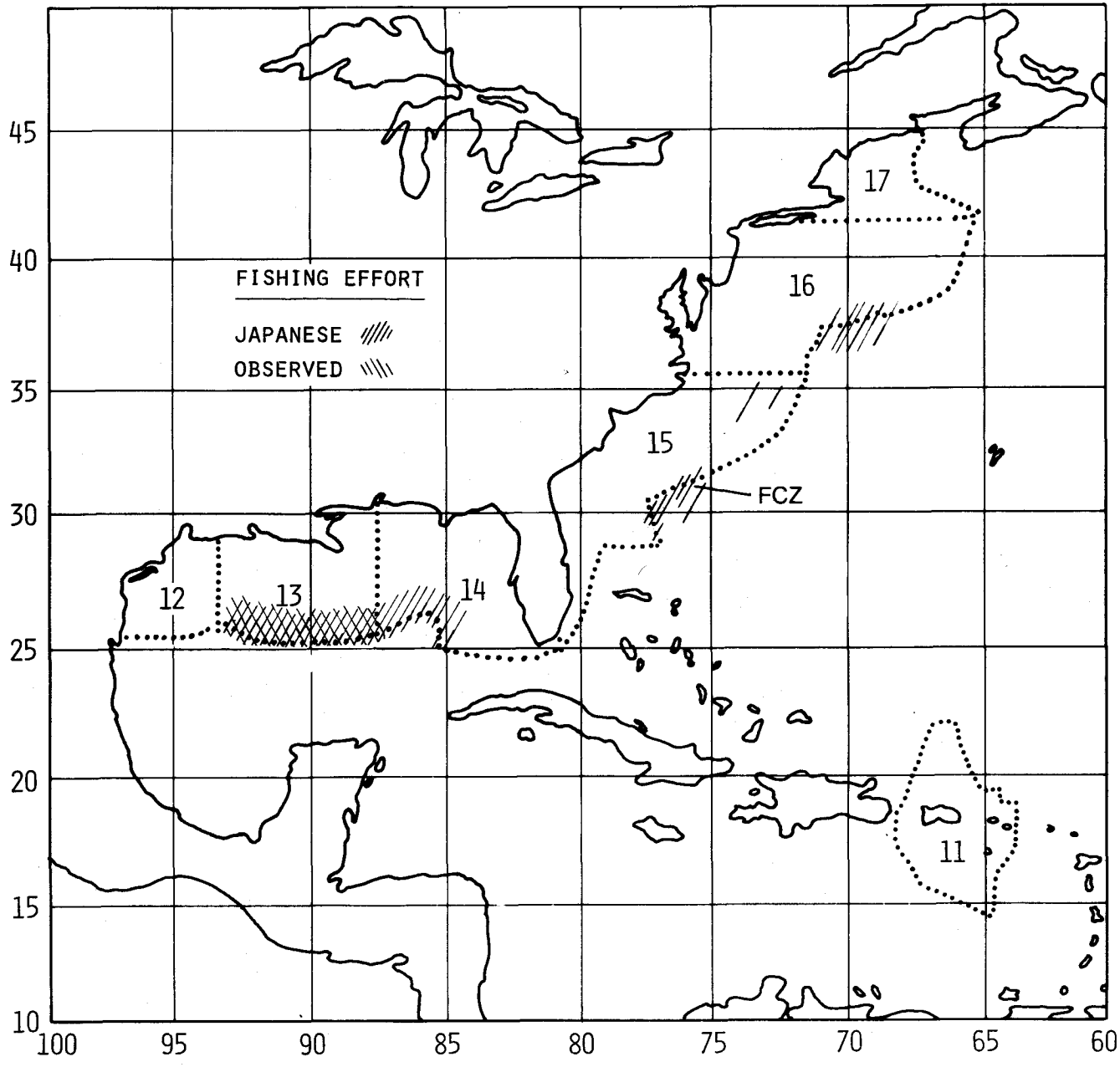


Figure 5. Japanese fishing effort and observer coverage for the second quarter, April to June, Of 1979.

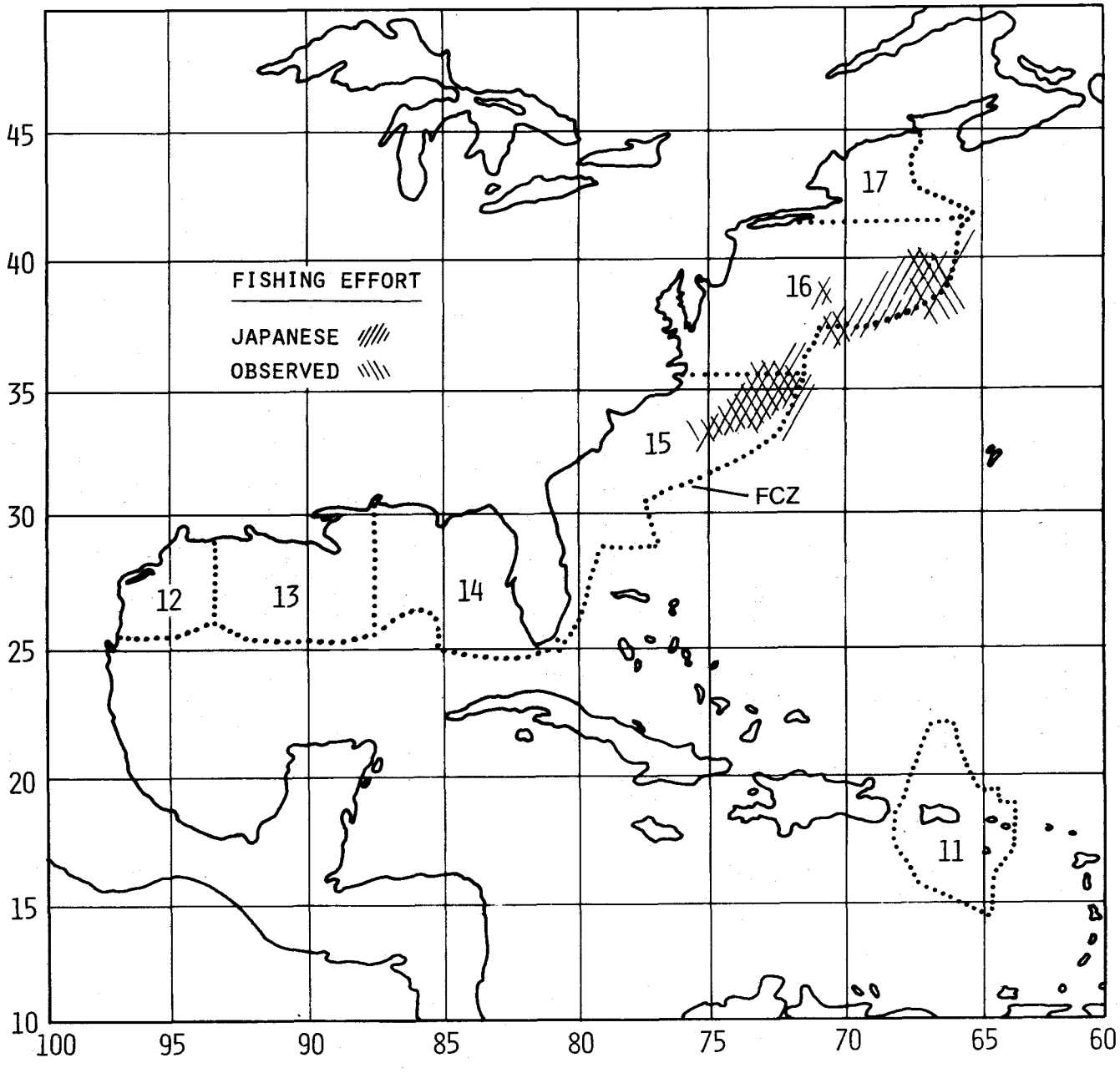


Figure 6. Japanese fishing effort and observer coverage for the third quarter, July to September, of 1979.

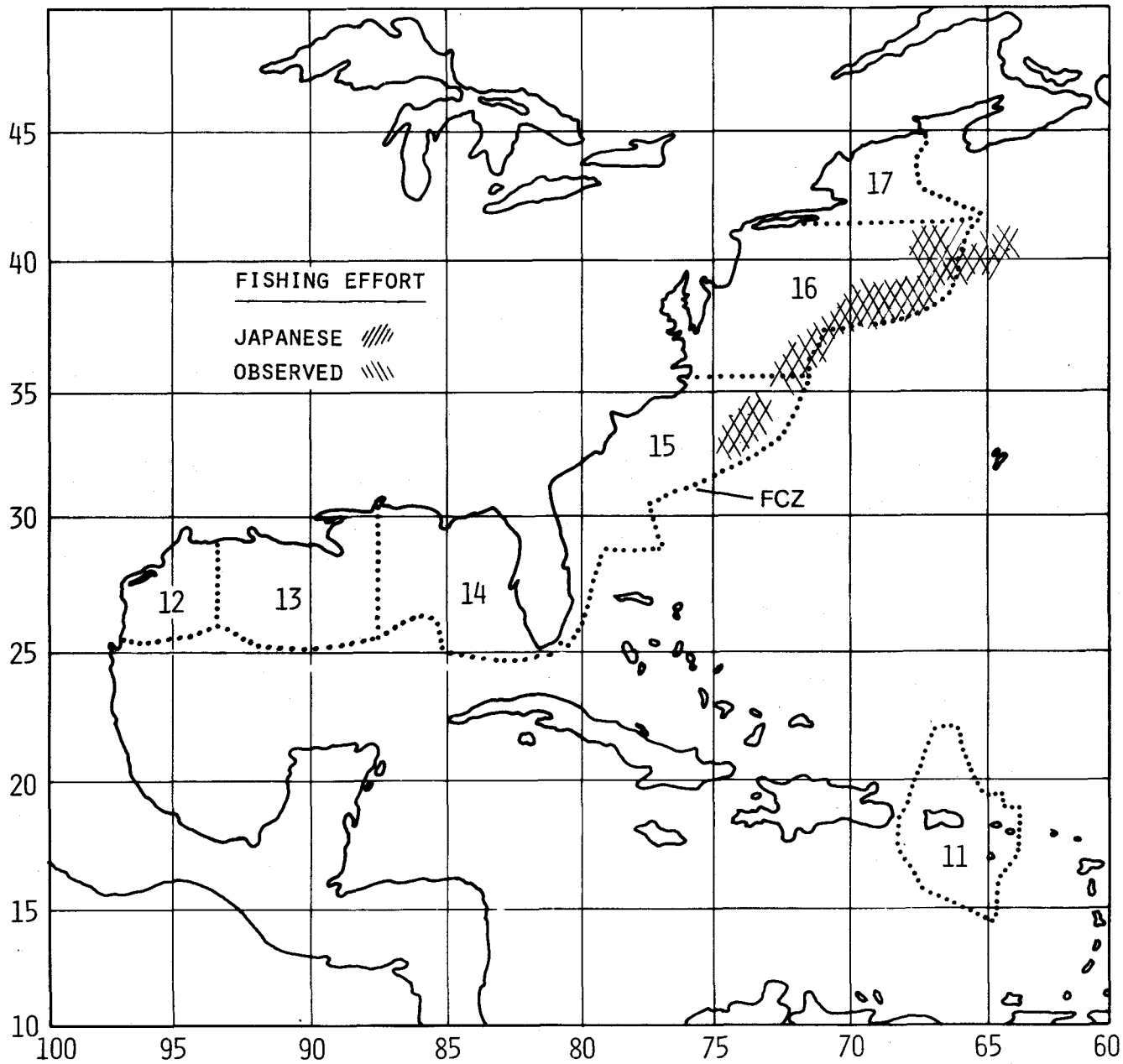


Figure 7. Japanese fishing effort and observer coverage for the fourth quarter, October to December, Of 1979.

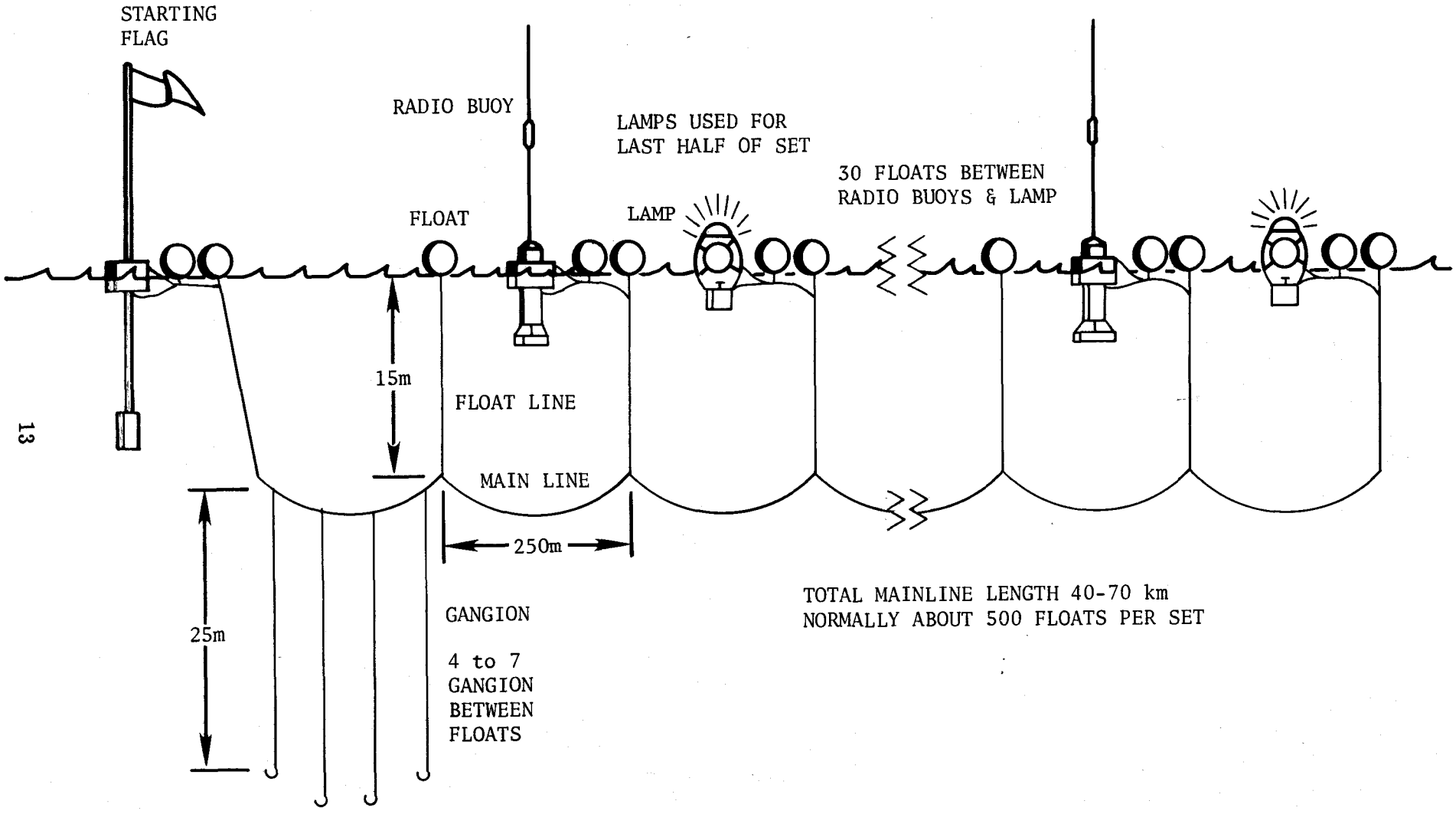


Figure 8. A typical Japanese longline set for tuna.

To collect data, the observer positions himself in a location with a relatively unrestricted view of the haulback operation. The observer records on a data sheet all pertinent information regarding gear setting operations, gear descriptions, haulback operations, and environmental data for each day of fishing (Appendix A). Catch information on species hooked is recorded with biological information for that species. During haulback, an observer must also tag billfishes and sharks, take specimens, record marine mammal and sea turtle sightings, and collect data related to compliance functions for NMFS enforcement.

The data are checked for errors, keypunched, and verified for input into the SEFC Data Management System after the observer has returned from his tour of duty.

2.6 JAPANESE DATA

Specific reporting requirements by the foreign fishing vessels are determined by the Foreign Fishing Regulations (December 19, 1978). For vessels of a nation without an applicable allocation, such as the 1979 Japanese longline tuna fishery, the regulations covering the Atlantic, Caribbean, and Gulf of Mexico exempt these vessels from the requirement of maintaining daily cumulative catch data and submitting a weekly catch report. However, weekly reports of receipts of U.S. harvested fish and of marine mammal incidental catches, if they occur, are required. Additionally, the Japanese are required to submit quarterly reports on catch effort data (Appendix B). These data are summarized weekly by one degree squares and include the following: (1) number of hooks set, (2) number of sharks caught under allocation, and (3) number of prohibited species (by species code) caught and released alive. Also required is a quarterly summary of vessel activities containing the following information (Appendix C): (1) permit number of each vessel fishing, and (2) the noon-day location (within 0.1 degree of latitude and longitude) of each vessel in the FCZ for each successive day of the reporting period.

The quarterly reports are to be submitted no later than 60 days after the end of the quarter to the Director, SEFC, Miami, Florida. Upon submission, the quarterly report normally is keypunched and verified for input into the SEFC Data Management System.

Foreign fishing regulations also require specific radio reports from foreign fishing vessels in the FCZ. These include the time and at what position the vessel began fishing, the time and position of its return to the fishing grounds, the time and position of any shift in fishing zones, and the time and at what position the the vessel ceases fishing (i.e., leaves the FCZ). These communiques are radioed to the Coast Guard where they are entered into the Enforcement Management Information System (EMIS).

SECTION 3.0

DATA EVALUATION

The SEFC Foreign Fishery Observer Project is responsible for data evaluation of descriptive and summary statistical reports on Japanese longline fishing activities, review of Japanese quarterly reports, and for providing preliminary estimates of the total catch of prohibited species. This data evaluation will be used by the SEFC in cooperation with Fishery Management Councils and other management authorities for development and evaluation of Fishery Management Plans, position papers, and other documentation needed for research and management of fishery stocks in the FCZ.

3.1 FISHING EFFORT

Japanese vessel activity days reported in EMIS are summarized by zone in Table 1. Included in this summary is comparable information taken from noon-day locations provided by the Japanese in their quarterly reports. Discrepancies between the two data sets appeared consistently throughout the Table. An example of the discrepancies can be found with vessel permit number JA791225. EMIS shows the vessel spent 120 days in the FCZ. The noon-day locations, however, indicate the vessel only spent 109 days in the FCZ although as many as 13 of these days actually may have been outside the FCZ. Also, EMIS did not indicate the vessel had been in Zone 12 for 3 days, as shown by the noon-day location reports. The number of days shown for this vessel in Zone 16 were also significantly different in the two reports.

Total days in Table 1 indicate a total 1979 fishing effort of 3,355 days based on EMIS-derived information compared to 3,257 days from the noon-day location reports. A total of 531 days included in the noon-day reports, however, were found to be outside the FCZ. The least number of days for a zone reported by EMIS was for Zone 17 (5 days) compared to 5 days from the noon-day location reports. The maximum number of days reported for a zone by EMIS was 1,379 for Zone 13 with only 1,285 days being computed from the noon-day location reports. The largest discrepancy in days reported appears in Zone 16 with 1,119 days reported by EMIS and only 631 days indicated in the noon-day location reports.

3.2 CATCH RATES

Annual and quarterly catches and catch rates from observer data and Japanese quarterly reports were summarized and presented in the same species format used in the Japanese quarterly reports (Tables 2-8). A statistical comparison of these two data sets, however, was not straightforward due to the way the Japanese data were reported. A modification of reporting requirements for the Japanese is needed to avoid continuation of this problem.

Sample catch rates for observer data were computed by dividing the number of fish of a given species caught during a set by the number of hooks in the set. The quotient was multiplied by 100 to express catch by hundred hooks as:

Table 1 - Comparison of days obtained from Japanese radio reports (EMIS) and Japanese quarterly reports for 1979.

Vessel Permit Number	Report	Total Days	Reported Days Outside FCZ	Zone 12	13	14	15	16	17
JA791202	EMIS	48	-	-	-	-	25	23	-
	Japanese	35	4	-	-	-	24	7	-
JA791207	EMIS	1	-	-	-	-	-	1	-
	Japanese	0	-	-	-	-	-	0	-
JA791209	EMIS	33	-	-	33	0	-	-	-
	Japanese	36	2	-	31	3	-	-	-
JA791210	EMIS	60	-	-	-	-	4	56	-
	Japanese	62	7	-	-	-	13	42	-
JA791211	EMIS	2	-	-	-	-	-	2	-
	Japanese	2	-	-	-	-	-	2	-
JA791214	EMIS	4	-	-	-	-	-	4	-
	Japanese	1	-	-	-	-	-	1	-
JA791216	EMIS	94	-	0	71	0	9	14	-
	Japanese	104	6	1	66	3	14	14	-
JA791219	EMIS	5	-	-	-	-	-	5	-
	Japanese	4	-	-	-	-	-	4	-
JA791220	EMIS	86	-	9	60	0	17	0	0
	Japanese	110	4	6	77	1	11	6	5
JA791225	EMIS	120	-	0	74	-	-	46	-
	Japanese	109	13	3	67	-	-	26	-
JA791228	EMIS	1	-	-	-	-	1	-	-
	Japanese	0	-	-	-	-	0	-	-
JA791229	EMIS	1	-	-	-	-	1	-	-
	Japanese	0	-	-	-	-	0	-	-

Vessel Permit Number	Report	Total Days	Reported Days Outside FCZ	Zone 12	13	14	15	16	17
JA791231	EMIS	77	-	3	74	-	-	-	-
	Japanese	71	20	7	44	-	-	-	-
JA791232	EMIS	88	-	0	53	6	0	29	-
	Japanese	93	24	1	48	0	2	18	-
JA791234	EMIS	130	-	-	85	1	11	33	-
	Japanese	148	38	-	69	4	8	29	-
JA791235	EMIS	150	-	-	73	12	21	44	-
	Japanese	152	27	-	66	13	21	25	-
JA791236	EMIS	24	-	-	-	-	-	24	-
	Japanese	22	20	-	-	-	-	2	-
JA791237	EMIS	105	-	-	-	-	43	62	-
	Japanese	95	39	-	-	-	33	23	-
JA791238	EMIS	63	-	-	48	15	-	-	-
	Japanese	61	-	-	35	26	-	-	-
JA791239	EMIS	61	-	-	-	-	-	61	-
	Japanese	62	16	-	-	-	-	46	-
JA791240	EMIS	191	-	-	44	13	77	57	-
	Japanese	188	17	-	29	24	71	47	-
JA791242	EMIS	132	-	-	-	-	42	90	-
	Japanese	160	47	-	-	-	60	53	-
JA791244	EMIS	204	-	-	51	10	113	30	-
	Japanese	196	6	-	58	23	85	24	-
JA791245	EMIS	131	-	-	49	13	48	21	-
	Japanese	132	16	-	46	12	41	17	-
JA791246	EMIS	62	-	-	-	-	-	62	-
	Japanese	62	43	-	-	-	-	19	-

Table 1 - (con't)

Vessel Permit Number	Report	Total Days	Reported Days Outside FCZ	Zone 12	13	14	15	16	17
JA791248	EMIS	213	-	-	29	55	63	66	-
	Japanese	197	26	-	47	33	58	33	-
JA791249	EMIS	99	-	-	70	7	-	22	-
	Japanese	95	10	-	55	18	-	12	-
JA791250	EMIS	111	-	-	12	61	0	38	-
	Japanese	93	6	-	56	19	2	10	-
JA791251	EMIS	85	-	-	-	-	53	32	-
	Japanese	76	15	-	-	-	40	21	-
JA791252	EMIS	62	-	0	60	2	-	-	-
	Japanese	57	3	3	50	1	-	-	-
JA791255	EMIS	76	-	-	-	-	22	54	-
	Japanese	57	22	-	-	-	13	22	-
JA791256	EMIS	112	-	-	-	-	28	84	-
	Japanese	119	45	-	-	-	24	50	-
JA791263	EMIS	63	-	0	63	0	-	-	-
	Japanese	62	2	1	57	2	-	-	-
JA791264	EMIS	117	-	0	85	8	-	24	-
	Japanese	109	11	3	62	10	-	23	-
JA791268	EMIS	50	-	-	-	-	4	46	-
	Japanese	41	11	-	-	-	7	23	-
JA791269	EMIS	16	-	-	-	-	-	16	-
	Japanese	16	3	-	-	-	-	13	-
JA791271	EMIS	3	-	-	-	-	-	3	-
	Japanese	4	2	-	-	-	-	2	-
JA791275	EMIS	4	-	-	-	-	-	4	-
	Japanese	3	1	-	-	-	-	2	-

Vessel Permit Number	Report	Total Days	Reported Days Outside FCZ	Zone 12	13	14	15	16	17
JA791277	EMIS	21	-	-	-	-	3	18	-
	Japanese	18	3	-	-	-	10	5	-
JA791278	EMIS	8	-	-	-	-	0	8	-
	Japanese	7	-	-	-	-	2	5	-
JA791279	EMIS	11	-	-	-	-	-	11	-
	Japanese	2	1	-	-	-	-	1	-
JA791280	EMIS	8	-	-	-	-	-	8	-
	Japanese	1	-	-	-	-	-	1	-
JA791283	EMIS	76	-	4	72	-	-	-	-
	Japanese	73	12	2	59	-	-	-	-
JA791292	EMIS	9	-	-	-	-	-	9	-
	Japanese	0	-	-	-	-	-	0	-
JA791294	EMIS	64	-	0	57	7	-	-	-
	Japanese	64	2	1	53	8	-	-	-
JA791300	EMIS	6	-	-	-	-	6	-	-
	Japanese	3	-	-	-	-	3	-	-
JA791305	EMIS	35	-	-	9	26	-	-	-
	Japanese	34	-	-	21	13	-	-	-
JA791308	EMIS	101	-	-	92	0	0	9	-
	Japanese	98	2	-	89	1	4	2	-
JA791311	EMIS	45	-	-	37	8	-	-	-
	Japanese	44	-	-	36	8	-	-	-
JA791314	EMIS	79	-	-	78	1	-	-	-
	Japanese	78	5	-	64	9	-	-	-
Totals	EMIS	3,355	-	16	1,379	245	591	1,119	5
	Japanese	3,257	531	28	1,285	231	546	631	5

Table 2 - Comparison of catch rates from observer records and the Japanese Quarterly Report for the first quarter of 1979 in the Atlantic

Species	Report	Number Caught	Mean Catch/100 Hooks	Standard Deviation	95% Confidence Limits Lower	Upper	t-Test for Diff. Between Catch Rates (95% Confidence)* t	H:$\bar{x}=\mu$	Mortality (% Dead)	t-Test for Diff. Between Mortalities (95% Confidence)* t	H:$\bar{x}=\mu$
Blue Marlin	Observer	3	0.0056	0.0276	-0.0060	0.0173	0.6922	Accept	33.3	-0.3848	Accept
	Japanese	11	0.0017	-	-	-			45.5		
White Marlin	Observer	4	0.0075	0.0254	-0.0032	0.0182	0.6365	Accept	50.0	0.1345	Accept
	Japanese	28	0.0042	-	-	-			46.4		
Sailfish	Observer	0	No Data	-	-	-	-	-	-	-	-
	Japanese	1	0.0002	-	-	-	-	-	0.0		
Spearfish	Observer	0	No Data	-	-	-	-	-	-	-	-
	Japanese	4	0.0006	-	-	-	-	-	75.0		
Swordfish	Observer	96	0.2210	0.4245	0.0418	0.4003	1.8557	Accept	51.6	0.2937	Accept
	Japanese	398	0.0602	-	-	-			50.0		
Shark	Observer	371	0.8236	0.2508	0.7177	0.9295	4.0493	Reject	08.3	-4.4989	Reject
	Japanese	4,071	0.6163	-	-	-			16.2		
Other	Observer	268	0.5545	0.2838	0.4347	0.6749	6.8634	Reject	39.9	7.7067	Reject
	Japanese	1,037	0.1569	-	-	-			16.6		

Numbers Sets	Observer	24
	Japanese	341**
Number Hooks	Observer	46,490
	Japanese	660,582

*Hypothesis (H) being tested is the mean rate computed from observer data ($\bar{x}$) is equal to the mean rate computed from Japanese Quarterly Report data (μ). Hypothesis is rejected if the rates are significantly different at the 95% confidence level.

**Japanese number of sets estimated by dividing total hooks reported by the mean number of hooks per set recorded by observers (1937).

Table 3 - Comparison of catch rates from observer records and the Japanese Quarterly Report for the third quarter of 1979 in the Atlantic

Species	Report	Number Caught	Mean Catch/100 Hooks	Standard Deviation	95% Confidence Limits Lower	Upper	t-Test for Diff. Between Catch Rates (95% Confidence) * t	H:$\bar{x}=\mu$	Mortality (% Dead)	t-Test for Diff. Between Mortalities (95% Confidence) * t	H:$\bar{x}=\mu$
Blue Marlin	Observer	140	0.0553	0.0674	0.0428	0.0678	3.9935	Reject	41.4	0.5177	Accept
	Japanese	238	0.0302	-	-	-			38.7		
White Marlin	Observer	594	0.2265	0.2385	0.1824	0.2706	2.3336	Reject	61.4	3.5051	Reject
	Japanese	1,376	0.1746	-	-	-			52.9		
Sailfish	Observer	89	0.0359	0.0721	0.0226	0.0493	0.5503	Accept	74.2	2.1649	Reject
	Japanese	254	0.0322	-	-	-			61.8		
Spearfish	Observer	141	0.0568	0.1039	0.0376	0.0760	2.3223	Reject	67.9	0.0403	Accept
	Japanese	270	0.0343	-	-	-			67.8		
Swordfish	Observer	86	0.0329	0.0487	0.0239	0.0419	2.3582	Reject	84.7	2.9260	Reject
	Japanese	174	0.0221	-	-	-			68.6		
Shark	Observer	2,227	0.8114	0.8205	0.6596	0.9632	0.5163	Accept	06.1	-3.2978	Reject
	Japanese	6,084	0.7719	-	-	-			08.2		
Other	Observer	3,103	1.2139	0.4658	1.1277	1.3001	17.5246	Reject	73.8	6.3277	Reject
	Japanese	3,568	0.4527	-	-	-			66.7		

Numbers Sets	Observer	115
	Japanese	351**
Number Hooks	Observer	258,345
	Japanese	788,206

*Hypothesis (H) being tested is the mean rate computed from observer data ($\bar{x}$) is equal to the mean rate computed from Japanese Quarterly Report data (μ). Hypothesis is rejected if the rates are significantly different at the 95% confidence level.

**Japanese number of sets estimated by dividing total hooks reported by the mean number of hooks per set recorded by observers (2246).

Table 4 - Comparison of catch rates from observer records and the Japanese Quarterly Report for the fourth quarter of 1979 in the Atlantic

Species	Report	Number Caught	Mean Catch/100 Hooks	Standard Deviation	95% Confidence Limits Lower	Upper	t-Test for Diff. Between Catch Rates (95% Confidence)* t	H:$\bar{x}=\mu$	Mortality (% Dead)	t-Test for Diff. Between Mortalities (95% Confidence)* t	H:$\bar{x}=\mu$
Blue Marlin	Observer	30	0.0085	0.0254	0.0045	0.0126	1.3277	Accept	51.7	1.1854	Accept
	Japanese	72	0.0058	-	-	-			38.9		
White Marlin	Observer	300	0.0839	0.1467	0.0606	0.1071	0.4598	Accept	63.7	3.7184	Reject
	Japanese	979	0.0785	-	-	-			51.6		
Sailfish	Observer	16	0.0044	0.0146	0.0021	0.0067	0.6844	Accept	62.5	0.3298	Accept
	Japanese	45	0.0036	-	-	-			57.8		
Spearfish	Observer	64	0.0181	0.0515	0.0099	0.0262	0.5578	Accept	56.3	0.6891	Accept
	Japanese	255	0.0204	-	-	-			51.4		
Swordfish	Observer	329	0.0888	0.1465	0.0656	0.1120	2.3104	Reject	76.2	1.5574	Accept
	Japanese	768	0.0616	-	-	-			71.7		
Shark	Observer	3,630	0.9525	0.7058	0.8417	1.0632	2.3189	Reject	07.1	2.0834	Reject
	Japanese	10,448	0.8374	-	-	-			06.1		
Other	Observer	4,152	1.1687	0.2297	1.1327	1.2047	53.0267	Reject	51.6	7.3778	Reject
	Japanese	2,414	0.1935	-	-	-			42.2		

Numbers Sets	Observer	156
	Japanese	541**
Number Hooks	Observer	358,716
	Japanese	1,247,597

*Hypothesis (H) being tested is the mean rate computed from observer data ($\bar{x}$) is equal to the mean rate computed from Japanese Quarterly Report data (μ). Hypothesis is rejected if the rates are significantly different at the 95% confidence level.

**Japanese number of sets estimated by dividing total hooks reported by the mean number of hooks per set recorded by observers (2299).

Table 5 - Comparison of catch rates from observer records and the Japanese Quarterly Report for the first quarter of 1979 in the Gulf of Mexico

Species	Report	Number Caught	Mean Catch/100 Hooks	Standard Deviation	95% Confidence Limits Lower	Upper	t-Test for Diff. Between Catch Rates (95% Confidence)* t	H:$\bar{x}=\mu$	Mortality (% Dead)	t-Test for Diff. Between Mortalities (95% Confidence)* t	H:$\bar{x}=\mu$
Blue Marlin	Observer	12	0.0038	0.0123	0.0017	0.0059	2.3616	Reject	75.0	1.5328	Accept
	Japanese	30	0.0013	-	-	-			50.0		
White Marlin	Observer	34	0.0107	0.0206	0.0071	0.0142	0.6204	Accept	58.8	1.4054	Accept
	Japanese	220	0.0096	-	-	-			45.9		
Sailfish	Observer	1	0.0003	0.0038	-0.0003	0.0010	-2.1403	Reject	0.0	-1.0753	Accept
	Japanese	22	0.0010	-	-	-			27.3		
Spearfish	Observer	1	0.0003	0.0038	-0.0003	0.0010	-1.8346	Accept	100.0	1.8674	Accept
	Japanese	21	0.0009	-	-	-			33.3		
Swordfish	Observer	301	0.0977	0.0921	0.0821	0.1134	2.3591	Reject	76.3	2.8765	Reject
	Japanese	1,809	0.0790	-	-	-			68.2		
Shark	Observer	224	0.0699	0.0573	0.0602	0.0796	-3.4472	Reject	17.4	0.0347	Accept
	Japanese	1,991	0.0869	-	-	-			17.3		
Other	Observer	370	0.1198	0.0680	0.1083	0.1312	11.4823	Reject	71.3	2.7722	Reject
	Japanese	1,206	0.0526	-	-	-			63.6		
Numbers Sets	Observer	135									
	Japanese	996**									
Number Hooks	Observer	310,926									
	Japanese	2,290,711									

*Hypothesis (H) being tested is the mean rate computed from observer data ($\bar{x}$) is equal to the mean rate computed from Japanese Quarterly Report data (μ). Hypothesis is rejected if the rates are significantly different at the 95% confidence level.

**Japanese number of sets estimated by dividing total hooks reported by the mean number of hooks per set recorded by observers (2303).

Table 6 - Comparison of catch rates from observer records and the Japanese Quarterly Report for the second quarter of 1979 in the Gulf of Mexico

Species	Report	Number Caught	Mean Catch/100 Hooks	Standard Deviation	95% Confidence Limits Lower	Upper	t-Test for Diff. Between Catch Rates (95% Confidence)* t	H:$\bar{x}=\mu$	Mortality (% Dead)	t-Test for Diff. Between Mortalities (95% Confidence)* t	H:$\bar{x}=\mu$
Blue Marlin	Observer	12	0.0087	0.0215	0.0033	0.0140	1.8233	Accept	50.0	0.9182	Accept
	Japanese	48	0.0038	-	-	-			35.4		
White Marlin	Observer	7	0.0054	0.0180	0.0009	0.0098	-1.9111	Accept	71.4	1.2663	Accept
	Japanese	122	0.0097	-	-	-			47.5		
Sailfish	Observer	0	No Data	-	-	-	-	-	-	-	-
	Japanese	5	0.0004						80.0		
Spearfish	Observer	0	No Data	-	-	-	-	-	-	-	-
	Japanese	12	0.0010						33.3		
Swordfish	Observer	76	0.0534	0.0458	0.0420	0.0648	0.3668	Accept	77.6	3.0239	Reject
	Japanese	641	0.0513	-	-	-			60.8		
Shark	Observer	142	0.1010	0.1756	0.0573	0.1448	0.5421	Accept	13.3	-1.2496	Accept
	Japanese	1,114	0.0891	-	-	-			17.3		
Other	Observer	163	0.1171	0.1497	0.0798	0.1544	4.0401	Reject	64.7	2.2076	Reject
	Japanese	518	0.0415	-	-	-			55.0		

Numbers Sets	Observer	64
	Japanese	616**
Number Hooks	Observer	140,976
	Japanese	1,249,620

*Hypothesis (H) being tested is the mean rate computed from observer data ($\bar{x}$) is equal to the mean rate computed from Japanese Quarterly Report data (μ). Hypothesis is rejected if the rates are significantly different at the 95% confidence level.

**Japanese number of sets estimated by dividing total hooks reported by the mean number of hooks per set recorded by observers (2203).

Table 7 - Comparison of catch rates from observer records and the Japanese Quarterly Reports for 1979 in the Atlantic

Species	Report	Number Caught	Mean Catch/100 Hooks	Standard Deviation	95% Confidence Limits Lower	Upper	t-Test for Diff. Between Catch Rates (95% Confidence)* t	H:$\bar{x}=\mu$	Mortality (% Dead)	t-Test for Diff. Between Mortalities (95% Confidence)* t	H:$\bar{x}=\mu$
Blue Marlin	Observer	173	0.0265	0.0519	0.0206	0.0325	4.8317	Reject	43.0	0.8845	Accept
	Japanese	321	0.0119	-	-	-			38.9		
White Marlin	Observer	898	0.1332	0.1986	0.1105	0.1560	3.8744	Reject	62.2	5.1167	Reject
	Japanese	2,383	0.0884	-	-	-			52.3		
Sailfish	Observer	105	0.0163	0.0487	0.0107	0.0219	1.8339	Accept	72.4	1.9947	Reject
	Japanese	300	0.0111	-	-	-			61.8		
Spearfish	Observer	205	0.0317	0.0775	0.0228	0.0406	2.6816	Reject	64.2	1.0776	Accept
	Japanese	529	0.0196	-	-	-			59.9		
Swordfish	Observer	511	0.0778	0.1699	0.0583	0.0972	2.8407	Reject	73.0	1.3158	Accept
	Japanese	1,340	0.0497	-	-	-			64.9		
Shark	Observer	6,228	0.9209	0.9906	0.8079	1.0339	2.7187	Reject	6.8	-4.9000	Reject
	Japanese	20,603	0.7641	-	-	-			8.7		
Other	Observer	7,523	1.1363	0.1791	1.1159	1.1567	84.0078	Reject	60.5	11.6523	Reject
	Japanese	7,019	0.2603	-	-	-			50.9		

Numbers Sets	Observer	295
	Japanese	1,199**
Number Hooks	Observer	663,551
	Japanese	2,696,385

*Hypothesis (H) being tested is the mean rate computed from observer data ($\bar{x}$) is equal to the mean rate computed from Japanese Quarterly Report data (μ). Hypothesis is rejected if the rates are significantly different at the 95% confidence level.

**Japanese number of sets estimated by dividing total hooks reported by the mean number of hooks per set recorded by observers (2249).

Table 8 - Comparison of catch rates from observer records and the Japanese Quarterly Reports for 1979 in the Gulf of Mexico

Species	Report	Number Caught	Mean Catch/100 Hooks	Standard Deviation	95% Confidence Limits Lower	Upper	t-Test for Diff. Between Catch Rates (95% Confidence)* t	H:$\bar{x}=\mu$	Mortality (% Dead)	t-Test for Diff. Between Mortalities (95% Confidence)* t	H:$\bar{x}=\mu$
Blue Marlin	Observer	24	0.0054	0.0160	0.0032	0.0076	2.8213	Reject	62.5	1.8572	Accept
	Japanese	78	0.0022	-	-	-			41.0		
White Marlin	Observer	41	0.0089	0.0199	0.0062	0.0117	-0.5671	Accept	61.0	1.7656	Accept
	Japanese	342	0.0097	-	-	-			46.5		
Sailfish	Observer	1	0.0002	0.0031	-0.0002	0.0007	-2.7303	Reject	0.0	-1.2840	Accept
	Japanese	27	0.0008	-	-	-			37.0		
Spearfish	Observer	1	0.0002	0.0031	-0.0002	0.0007	-3.1854	Reject	100.0	1.8831	Accept
	Japanese	33	0.0009	-	-	-			33.3		
Swordfish	Observer	377	0.0835	0.0827	0.0719	0.0950	2.4393	Reject	76.5	4.0947	Reject
	Japanese	2,450	0.0692	-	-	-			66.3		
Shark	Observer	366	0.0799	0.1106	0.0645	0.0952	-0.9821	Accept	15.8	-0.7326	Accept
	Japanese	3,105	0.0876	-	-	-			17.3		
Other	Observer	533	0.1189	0.1013	0.1048	0.1330	9.7898	Reject	69.3	3.4357	Reject
	Japanese	1,719	0.0486	-	-	-			61.2		

Numbers Sets	Observer	199
	Japanese	1,606**
Number Hooks	Observer	451,902
	Japanese	3,540,331

*Hypothesis (H) being tested is the mean rate computed from observer data ($\bar{x}$) is equal to the mean rate computed from Japanese Quarterly Report data (μ). Hypothesis is rejected if the rates are significantly different at the 95% confidence level.

**Japanese number of sets estimated by dividing total hooks reported by the mean number of hooks per set recorded by observers (2271).

$$x_{ij} = \frac{Fij}{Hj} \times 100 \qquad (1)$$

where Fij = number of i-th species caught during the j-th set, and
Hj = number of hooks in the j-th set.

Catch rates from the Japanese quarterly reports were computed by dividing the total number of a given species caught in a quarterly or annual time period by the total number of hooks reported during the same period. The quotient was multiplied by 100 to express catch rate on a hundred hook basis. The computation provided quarterly and annual catch rates which, if accurately reported by the Japanese, should represent population means (μ).

Population variances for the Japanese data were not computed due to confounding, a problem which should be corrected. Confounding was caused by the reporting procedure which required the Japanese to summarize catch data by one degree squares and 7-day periods. Thus, instead of a report entry representing a single set from which useful catch statistics could be computed; it represented anywhere from one to seven or more sets. While this type of reporting requirement probably does not significantly affect mean quarterly or annual catch rates, it essentially eliminates any possibility of deriving useful measures of population variances.

The Japanese-reported catch rates were evaluated quarterly and annually by comparison with observer-derived catch rates. This evaluation was done by a t-test as:

$$t_i = \frac{(\bar{x}_i - \mu_i)\sqrt{n}}{s_i} \qquad (2)$$

where: $\bar{x}_i$ = mean catch rate for i-th species from observer data

$$\bar{x}_i = \sum_{j=1}^{n} x_{ij}/n$$

μ_i = population catch rate for i-th species from Japanese data (assumes no reporting errors);

n = number of observer sets; and

s_i = standard deviation of observer reported catch rates for i-th species.

The mortality associated with prohibited species reported by observers was computed as:

$$Po_i = \frac{D_i}{T_i} \qquad (3)$$

where: D_i = number of species of i reported dead, and

T_i = number dead + number alive of species i.

Total catch of a prohibited species was not used in the denominator because the observers were instructed not to guess if there was any question about the condition of a given animal. This resulted in a relatively small, but nevertheless significant, number of "unknowns" being reported which were excluded from the mortality computations. The Japanese, on the other hand, reported all captures as either dead or alive, without a category for "unknown." Thus, mortalities for the Japanese-reported catches of a given species were computed by dividing the number dead by the total number caught.

Capture mortalities reported by the Japanese were evaluated based on those derived from the observer data according to a technique described by Sokal and Rohlf (1969).

This technique relies on a t-test as:

$$t = \frac{\arcsin\sqrt{Po_i} - \arcsin\sqrt{Pj_i}}{\sqrt{820.8\ (1/To_i + 1/Tj_i)}} \qquad (4)$$

where: Po_i = dead proportion of species i reported by observers

Pj_i = dead proportion of species i reported by Japanese

To_i = number dead + number alive of species i reported by observers

Tj_i = number dead + number alive of species i reported by Japanese

820.8 = constant representing the parametric variance of a distribution of arcsine transformations of proportions.

Observers also record species of turtles and marine mammals caught in the Atlantic and Gulf of Mexico by foreign fishing vessels. Numbers caught, catch rates, and mortalities are listed in Tables 9 and 10. Comparable data are not provided in the Japanese quarterly reports.

3.3 TOTAL CATCH

The foreign Fishing Regulations require the Japanese to record in the quarterly reports all billfishes, sharks and other species hooked within the FCZ. A separate report is also required on endangered species and marine mammals hooked on longline gear within the FCZ.

Table 9 - Observed catches of sea turtles and marine mammals in the Atlantic for 1979

Species	No. Caught	Mean Catch/100 Hooks	Standard Deviation	95% Confidence Limits Lower	Upper	Mortality(%)
Unidentified Turtle	8	0.0011	0.0069	0.0004	0.0019	37.5
Leatherback	0	-	-	-	-	-
Loggerhead	9	0.0013	0.0089	0.0003	0.0023	00.0
Unidentified Porpoise	2	0.0004	0.0044	-0.0001	0.0009	00.0
Bottlenose	1	0.0001	0.0021	-0.0001	0.0004	00.0
False Killer Whale	2	0.0003	0.0055	-0.0003	0.0010	50.0

No. of Sets	295
No. Hooks	663,551

Table 10 - Observed catches of sea turtles and marine mammals in the Gulf of Mexico for 1979

Species	No. Caught	Mean Catch/100 Hooks	Standard Deviation	95% Confidence Limits Lower	Upper	Mortality(%)
Unidentified Turtle	10	0.0022	0.0105	0.0007	0.0036	10.0
Leatherback	2	0.0004	0.0043	-0.0002	0.0010	50.0
Loggerhead	0	-	-	-	-	-
Unidentified Porpoise	0	-	-	-	-	-
Bottlenose	0	-	-	-	-	-
False Killer Whale	0	-	-	-	-	-

No. of Sets	199
No. Hooks	451,902

Annual total catches of species hooked in the Atlantic (Table 11) and Gulf of Mexico (Table 12) were computed as:

$$H_i = \frac{\bar{X}_i \times JH}{100} \qquad (5)$$

where: H_i = total number hooked

$\bar{X}_i$ = mean observer catch rate/100 hooks for species i

Jh = total Japanese hooks

An additional total catch estimate was computed by converting the number of days reported to EMIS by area into the number of hooks. The EMIS estimated hook number was derived as:

$$Eeh = Ed \times \% df \times \bar{x}hs \qquad (6)$$

where: Eeh = EMIS estimated hooks

Ed = EMIS days reported by area (Table 1) in the FCZ

%df = % days fished (Atlantic 71.4% and Gulf 91.6%) computed from observer data

$\bar{x}$hs = mean hooks per set (Atlantic 2,249 and Gulf 2,271) computed from observer data

The EMIS estimated hook number was then used to compute the EMIS total catch estimates given in Tables 11 and 12.

Table 11 - Comparison of Total Japanese Reported 1979 Catches for the Atlantic

Species	Japanese Reports	Observer Estimates: Japanese Hook Reports* Catch	Japanese Hook Reports* 95% Conf.(±)	EMIS Estimated Hooks** Catch	EMIS Estimated Hooks** 95% Conf.(±)
Blue Marlin	321	715	159	730	162
White Marlin	2,383	3,592	612	3,668	625
Sailfish	300	440	151	449	154
Spearfish	529	855	240	873	245
Swordfish	1,340	2,098	526	2,143	537
Sharks	20,603	24,831	3,047	25,361	3,112
Other Fish	7,019	30,639	550	31,293	562
Unidentified Turtles	-	30	19	30	19
Leatherback Turtles	-	-	-	-	-
Loggerhead Turtles	-	35	27	36	28
Unidentified Porpoises	-	11	13	11	14
Bottlenose Dolphins	-	3	5	3	6
False Killer Whales	-	8	16	8	17

*Japanese Reported 2,696,385 hooks

**EMIS Estimated 2,753,923 hooks

Table 12 - Comparison of total Japanese Reported 1979 Catches for the Gulf of Mexico

Species	Japanese Reports	Observer Estimates: Japanese Hook Reports* Catch	Japanese Hook Reports* 95% Conf.(±)	EMIS Estimated Hooks** Catch	EMIS Estimated Hooks** 95% Conf. (±)
Blue Marlin	78	191	78	184	75
White Marlin	342	315	96	304	92
Sailfish	27	7	14	7	14
Spearfish	33	7	14	7	14
Swordfish	2,450	2,956	411	2,849	396
Sharks	3,105	2,829	545	2,726	525
Other Fish	1,719	4,209	499	4,056	481
Unidentified Turtles	-	78	53	75	51
Leatherback Turtles	-	14	21	14	20
Loggerhead Turtles	-	-	-	-	-
Unidentified Porpoises	-	-	-	-	-
Bottlenose Dolphin	-	-	-	-	-
False Killer Whales	-	-	-	-	-

*Japanese Reported 3,540,331 hooks

**EMIS Estimated 3,411,587 hooks

SECTION 4.0

DISCUSSION AND RECOMMENDATIONS

This technical report was prepared in accordance with requirements set forth in the Foreign Fishery Observer Project Management Plan. It specifically addresses data: those collected by the foreign fishery observers and those reported quarterly by the Japanese to the Southeast Fisheries Center. In this report, two other topics also are briefly discussed — observer deployments and the Enforcement Management Information System (EMIS). All of the above topics are discussed in the following sections and recommendations are provided to eliminate occurrence of any noted problems.

4.1 OBSERVER DEPLOYMENTS

The Foreign Fishery Observer Project is mandated to maintain a level of observer coverage aboard foreign fishing vessels commensurate with research needs and in support of FCMA compliance functions on a regional and interregional basis. A prerequisite for maintaining such coverage lies with establishing observer vessel boardings in a time frame consistent with FCZ entry. Otherwise, observer coverage becomes erratic and can fall below an optimum level. Realizing the complexity of communicating with foreign fishing fleets entering the United States FCZ and to ensure smooth observer boarding schedules, the following is recommended:

> Require that Japanese tuna vessels, which intend to conduct fishing operations in the FCZ, notify the Southeast Observer Project through their U.S. Shipping Agents 14 days prior to commencing fishing activities.

4.2 JAPANESE QUARTERLY REPORTS

One of the most serious problems noted during the analysis of data from the Japanese quarterly reports was the way in which their catch data were recorded. Briefly, they record their data summarized by one degree squares and 7-day periods. This reporting method virtually eliminates any possibility of deriving useful information on the variances associated with their catch rates and also makes it difficult to determine whether a set actually occurred in or outside the FCZ. These problems could be eliminated by requiring the Japanese to record catches on a set or daily basis. Furthermore, they should be required to record the number of hooks used in each set and to provide the exact positions (latitude and longitude) of start and end of the haulback.

Another serious problem is the differences between the Japanese reported catch rates and catch rates computed from observer data. For example, six out of seven catch rates reported by the Japanese for the Atlantic and five out of the seven reported rates for the Gulf of Mexico were lower than catch rates calculated from observer records (Tables 7 and 8). For the majority of these, the Japanese reported catches were significantly lower than those reported by the observers. These differences are apparently real. Observers aboard the vessels have compared their daily catch records with those maintained by the Japanese, and in almost every instance, they reported that the Japanese catches are less than those they recorded.

Mortalities for prohibited species reported by the Japanese also are less than those recorded by the observers (Tables 7 and 8).

A significant amount of valuable data are not being reported by the Japanese due to limited reporting requirements. It would be highly desirable to require that the Japanese record all species caught, including tunas, instead of lumping the catches into the broad species categories identified in the regulations. This reporting improvement could be cooperatively developed with the Japanese in a way that would not adversely affect their fishing operations and would still provide information needed for research and management applications.

4.3 ENFORCEMENT MANAGEMENT INFORMATION SYSTEM (EMIS)

As discussed in Section 2.5, there appear to be discrepancies in the Japanese daily vessel activity and movement reports radioed to the U.S. Coast Guard and those subsequently recorded in EMIS. Due to these discrepancies, it could be concluded that:

- The Japanese are not reporting vessel movements from one FCZ zone to another to the Coast Guard;
- The Japanese vessels are not reporting accurate entry or exit dates in the FCZ to the Coast Guard;
- The Japanese vessels are not reporting vessel days accurately in their quarterly reports, and/or
- The Coast Guard is not receiving or inputting all vessel reports into EMIS.

NMFS Enforcement and Coast Guard personnel should monitor EMIS on a regular basis and compare Japanese Quarterly Report vessel movements quarterly to locate those vessels which do not report accurate vessel movements within the FCZ.

LITERATURE CITED

SOKAL, R. R. and ROHLF, F. J., 1969. Biometry, the principles and practice of statistics in biological research, pp. 607 to 610. Copyright 1969 by W. H. Freeman and Company.

ACKNOWLEDGEMENTS

Special thanks are due to Dr. Andrew J. Kemmerer, who helped with organization, statistics and review of this report. Elmer Gutherz, Dr. Walter Nelson, Shelby B. Drummond, Wilber R. Seidel, and Gladys Reese reviewed the report and made many helpful suggestions. Additional thanks are given to Sam Burkett and Margery Bastian who developed the software for this report. Finally, the report could not have been completed without the typing of Sonya Sallee, the efforts of those observers who collected and verified the data and observer Mark Grace who designed the cover.

Appendix A

PASCAGOULA LABORATORY SURFACE LONGLINE OBSERVER FORM

VESSEL NAME: ______________________

CAPTAIN'S NAME: ______________________

OBSERVER: ______________________

1 VESSEL | 3 MONTH DAY YEAR | 9 SET | 10 PERMIT NUMBER

START SET 18 LATITUDE LONGITUDE | 26 TIME | 28 VES. SPD | 30 DIRECTION

END SET 33 LATITUDE LONGITUDE | 41 TIME | 43 TARGET | 45 BAIT

47 GANGION LENGTH | 49 FLOATLINE LENGTH | 52 LENGTH FLOAT-FLOAT | 55 NO. OF HOOKS | 59 NO. OF FLTS

START HAUL 62 LATITUDE LONGITUDE | 70 TIME | 72 VES. SPD | 74 DIRECTION | 77 ZONE

END HAUL 10 LATITUDE LONGITUDE | 18 TIME | 20 OBSVR. | 22 CAPTAIN

WATER TEMP. 24 START SET | 27 END SET | 30 START HAUL | 33 END HAUL

ENVIRO. RECORD AT NOON 36 WIND DIRECT. | 39 WIND SPD. | 41 WAVE DIRECT. | 44 Hk. Bt. Ft. | 46 WAVE HT.

48 AIR TEMP. | 51 BAROMETRIC PRESS. | 56 Δ | 57 TOTAL CATCH NO.

TUNA NO. | SHARKS NO. | BILLFISH NO. | OTHER NO.

COMMENTS:

GEAR DIAGRAM

SET

HAULBACK

VESSEL	MONTH	DAY	YEAR	SET	ZONE
1	3			9	77

SPEC. CODE	WEIGHT (kg)	WT. CODE	LENGTH (cm)	LEN. CODE	SP. STAT	TAG NUMBER	SAMPLE NUMBER	WATER TEMP.	SEX	GIRTH (cm)	HOOK NO.	TIME	COMM. CODE
	.		.					.					
	.		.					.					
	.		.					.					
	.		.					.					
	.		.					.					
	.		.					.					
	.		.					.					
	.		.					.					
	.		.					.					
	.		.					.					
	.		.					.					
	.		.					.					
	.		.					.					
	.		.					.					
	.		.					.					
	.		.					.					
	.		.					.					
	.		.					.					
	.		.					.					
	.		.					.					
	.		.					.					
	.		.					.					
	.		.					.					
	.		.					.					
	.		.					.					
	.		.					.					
	.		.					.					
	.		.					.					
	.		.					.					
	.		.					.					
	.		.					.					
	.		.					.					
	.		.					.					
	12	16	17	21	22	23	30	41	44	47	51	52	56

QUARTERLY STATISTICAL REPORT (1979)
CATCH AND EFFORT DATA REQUIRED BY FOREIGN FISHING REGULATION
611.60(g) (i)

VESSEL NAME: ____________ MARU NO. ___________ PERMIT NUMBER: __________________

DURATION	AREA 1° SQ		NO. OF HOOKS	NUMBER OF FISHES (BY SPECIES CODE)																					
	LAT (N)	LON (W)		252		260		256		264		254		469		299		236		240		244			
				A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
FROM																									
TO																									
FROM																									
TO																									
FROM																									
TO																									
FROM																									
TO																									
FROM																									
TO																									
FROM																									
TO																									
FROM																									
TO																									

A: NUMBER OF FISHES CAUGHT AND RELEASED
B: NUMBER OF FISHES RELEASED ALIVE

Appendix C.

QUARTERLY STATISTICAL REPORT (1979)
VESSEL ACTIVITIES DATA REQUIRED BY FOREIGN FISHING REGULATION
611.60(g) (ii)

VESSEL NAME: ____________ MARU NO: ________ PERMIT NUMBER: ____________

DATE (G.M.T.)	NOON-DAY LOCATION		DATE (G.M.T.)	NOON-DAY LOCATION		DATE (G.M.T.)	NOON-DAY LOCATION	
	LAT. N	LONG. W		LAT. N	LONG. W		LAT. N	LONG. W

Appendix D.

SCIENTIFC NAMES

Blue Marlin	-	*Makaira nigricans*
White Marlin	-	*Tetrapturus albidus*
Sailfish	-	*Istiophorus albicans*
Spearfish	-	*Tetrapturus pfluegeri*
Swordfish	-	*Xiphias gladius*
Leatherback	-	*Dermochelys coriacea*
Loggerhead	-	*Caretta caretta*
Bottlenose	-	*Tursiops truncatus*
False Killer Whale	-	*Pseudorca crassidens*