Actes du Symposium sur l'Oceanographie et les ressources halieutiques de l'Atlantique tropical. Abidjan. 20-28 octobre 1966. Paris, UNESCO, 1969.

26. THE JAPANESE ATLANTIC LONG - LINE FISHERY, 1956-1963

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INTRODUCTION

"The Japanese long-line fishery started in the Atlantic with an exploratory cruise by a research vessel off the coast of South America in December 1955... On the basis of this and several other successful exploratory cruises in 1956, the Japanese commercial fleet began fishing in the tropical Atlantic in 1957. Despite the great distance from Japan to Atlantic tuna fishing grounds, the progressive increase in fishing effort and landings attest to a highly successful fishery" (Shomura, 1966).

Until now, most studies of this fishery have covered relatively short periods (for example : Moraes, 1962 ; Lima and Wise, 1963 ; Nakagome, 1963 ; Nakagome and Suzuki, 1962, 1963), probably because catch and effort information has been fragmentary and difficult to obtain.

Recently, detailed statistics were published by Shiohama, Myojin, and Sakamoto (1965), and by the Fisheries Agency of Japan (1966). Shiohama et al. present a brief review (in Japanese) of the fishery and its development, followed by detailed tables of numbers of hooks used and catch in numbers by species, month, and 5-degree square, from June 1956 to December 1962 ; the Fisheries Agency carried these data to the end of 1963. Although neither collection of statistical information covers the whole fleet, a substantial percentage of the trips made in each year was included. The total trips and numbers of trips for which logbooks were available were :

Year	Number of trips	Logs available	Percentage
1956	4	4	100
1957	60	52	87
1958	131	51	39
1959	189	96	51
1960	243	181	74
1961	258	204	79
1962	331	196	59
1963	368	230	63

In our analyses, we have assumed that the part of the fleet covered by the available logs is representative of the effort, catch, and geographical distribution of the whole fleet.

CATCH AND EFFORT

The Japanese long-line fishery started on a commercial scale in 1957, when over 3 million hooks were set. The number of hooks increased rapidly - 54 million hooks were set in 1962 and 55 million in 1963 (Table 1).

The total catch in the 8 years was almost 12 million fish, distributed as follows : Yellowfin tuna, 52 ; Albacore, 31 ; Bigeye tuna, 9 ; Blue marlin, 3 ; White marlin, 2 ; Other marlins, 1 ; Bluefin tuna, 1 ; Swordfish, 1%. Black marlin and skipjack each made up less than 0.1% of the total catch.

More than 90% of the total catch in numbers was composed of three species of tuna - yellowfin, albacore, and bigeye. (From 1957 to 1960, over 95% of the catch was tunas). The remainder was mostly marlins.

Yellowfin tuna, which represented 65-80% of the total catch from the beginning through 1960, declined to less than 50% in 1962 and 1963. Albacore, approximately 10% of the catch for the first 3 years, increased to about 25% in 1959-1961, and to about 40% in 1962-1963. Bigeye tuna, less than 5% through 1960, made up 10-15% in 1961-1963.

The marlins were well under 5% of the catch through 1959, but in 1962-1963 made up about 10% of the total number of fish. Blue marlin and white marlin were the principal species.

The catch per 100 hooks for the whole Atlantic Ocean, by year, for tunas, marlins, and swordfish is shown in Table 2. The only tuna which showed a decline in catch rate was the yellowfin, which dropped from about 9 fish per 100 hooks in the first 3 years to less than 2 fish per 100 hooks in 1963. At the same time, the albacore and the bigeye showed apparent increases. Blue marlin catches showed a decline, but white marlin increased slightly.

We divided the Atlantic into 10 areas, taking into account ecological differences and varying fishing effort, and analyzed catch and effort data

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Table 1. Summary of catch and effort in the Japanese Atlantic long-line fishery, 1956-1963 (thousands of fish and thousands of hooks). (These are estimated figures, adjusted for the whole fleet on the basis of the sample in each year. The symbol Ø represents 500 fish or less)

Year	No. of hooks	Yellowfin tuna	Albacore	Bigeye tuna	Bluefin tuna	Blue marl.	White marl.	Black marl.	Other marl.	Sword-marl.	Skip-jack
1956	131	12	1	Ø	Ø	Ø	Ø	Ø	Ø	Ø	0
1957	3,374	258	32	9	Ø	9	11	Ø	3	1	0
1958	7,957	745	99	15	Ø	10	1	Ø	4	1	0
1959	15,240	1,092	355	45	3	22	7	Ø	5	2	Ø
1960	20,903	1,168	456	71	7	27	11	Ø	12	3	Ø
1961	26,180	972	425	252	4	43	37	1	27	11	Ø
1962	54,255	977	1,087	371	53	111	111	3	67	19	0
1963	55,004	866	1,134	285	67	96[1]	87[1]	5	51[2]	24	1

1. Includes striped marlin
2. Includes spearfish and sailfish

Table 2. Catch per 100 hooks, entire Atlantic Ocean, Japanese Atlantic long-line fishery, 1956-1963 ("0.0" means a catch of 0.05 fish per 100 hooks, or less)

Year	Yellowfin	Albacore	Bigeye	Bluefin	Blue marlin	White marlin	Black marlin	Other marlins	Swordfish
1956	9.2	0.8	0.1	0.0	0.4	0.0	0.0	0.0	0.0
1957	7.7	0.9	0.3	0.0	0.3	0.0	0.0	0.1	0.0
1958	9.4	1.2	0.2	0.0	0.1	0.0	0.0	0.0	0.0
1959	7.0	2.3	0.3	0.0	0.1	0.0	0.0	0.0	0.0
1960	5.6	2.2	0.3	0.0	0.1	0.1	0.0	0.1	0.0
1961	3.7	1.6	0.9	0.0	0.1	0.2	0.0	0.1	0.0
1962	1.8	2.0	0.7	0.1	0.2	0.2	0.0	0.1	0.0
1963	1.6	2.1	0.5	0.1	0.2[1]	0.2	0.0	0.1[2]	0.0

1. Includes striped marlin
2. Includes spearfish and sailfish

for each area separately. The 10 areas are shown in Figure 1 ; their names are abbreviated as follows :

Florida (FLA),
North Oceanic (West) (NOW),
North Oceanic (East) (NOE),
Cape Verde (CV),
Caribbean (CAR),
Guianas (GUI),
Gulf of Guinea (GG),
Bahia (BAH),
Benguela (BEN),
Rio de Janeiro (RIO),

Names were assigned for convenience. Some of the divisions between areas are not ideal - for instance, the boundaries of the Caribbean and Guianas areas - but the limit of resolution of five degrees of latitude and longitude in the published Japanese data dictated certain arbitrary choices.

The areas appear to be bounded by the limits of the chart in Figure 1. In fact, very little fishing was done outside these boundaries. Many of the areas, however, are more limited for practical purposes than the figure implies :

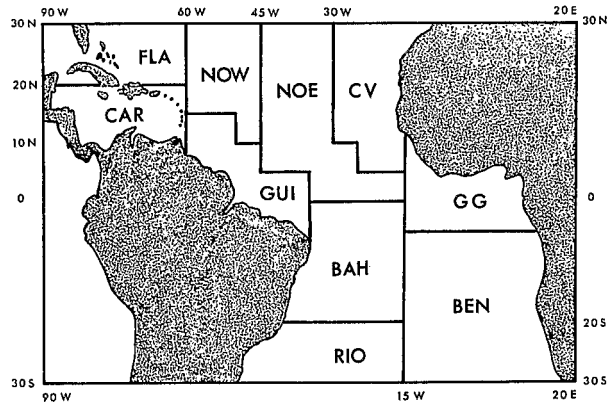

Fig. 1 Statistical areas used in analyses of catch and effort of the Japanese long-line fishery.

1. In the North Oceanic (West), North Oceanic (East), and Cape Verde areas, most of the fishing was south of 20°N latitude
2. In the Florida area, most of the fishing was east of 75°W latitude
3. In the Caribbean, most fishing was east of 80°W longitude
4. In the Benguela area, most fishing was north of 20°S latitude.

The fishing effort was not uniformly applied to the whole of the tropical Atlantic ; over 70% of the fishing in each year through 1960 was concentrated in the Gulf of Guinea, Cape Verde, North Oceanic (East), and Guianas areas (Table 3). All these are areas of high abundance of yellowfin tuna, are largely or completely north of the equator, and (all but the Guianas) are in the eastern Atlantic.

In 1961, when the overall apparent abundance of yellowfin had dropped to less than half the original level, only about 50% of the effort was expended in the original four areas (Table 2). The Bahia area, a good region for albacore, had begun to receive some 15% of the effort in 1959, increasing to about 20% in 1960 and 1961. Benguela, also a good area for albacore, became important in 1961.

By 1962, when the catch rate of yellowfin had dropped to approximately the same level as that of albacore, a new fishing pattern had been established. The original four areas received less than half the total effort, while 40% was devoted to the two important albacore areas, Bahia and Benguela. In 1963, the original four areas continued to receive about 40% of the effort; the two southern albacore areas received about 30% ; and the Florida area, a good region for albacore discovered in 1962, received over 10%.

Monthly catch rates from June 1956 through December 1963 for various species in each of the 10 areas are shown in the Appendix (tables A. 1 to A. 8). These values were obtained by

Table 3. Distribution of fishing effort of the Japanese Atlantic long-line fishery (as 1,000 hooks, adjusted for sampling)

Year	Area									
	GG	GUI	NOE	CV	BEN	CAR	NOW	BAH	RIO	FLA
1956	0	82	31	0	0	0	0	19	0	0
1957	1,327	515	1,218	234	0	5	1	74	0	0
1958	1,799	2,633	1,627	1,228	0	288	25	367	0	0
1959	2,985	2,822	3,362	3,293	15	257	91	2,392	17	0
1960	5,004	2,465	2,914	4,444	1,028	332	142	4,543	7	0
1961	7,486	550	2,102	4,238	5,650	91	89	5,668	340	0
1962	5,966	3,231	9.007	5,834	9,654	1,363	1,780	13,101	1,114	3,054
1963	6,476	3,303	8,059	5,728	7,756	2,553	3,135	8,194	2,802	6,995

Table 4. Catch rates and rates of decline for yellowfin tuna, Japanese Atlantic long-line fishery, 1956-1963

GG	6.6	11.5 (1958)	0.013	-0.671**	52
GUI	5.4	9.5 (1956)	0.008	-0.768**	74
NOE	4.8	8.2 (1958)	0.012	-0.645**	57
CV	4.1	7.9 (1958)	0.014	-0.577**	50
CAR	3.9	9.3 (1958)	0.007	-0.419**	35
BEN	3.6	8.0 (1960)	0.026	-0.577**	39
NOW	2.2	4.8 (1959)	0.015	-0.706**	25
BAH	1.7	6.0 (1957)	0.007	-0.350**	60
FLA	1.5	2.6 (1963)	-	- -	-
RIO	1.2	2.7 (1961)	≠	-0,016	18

1. Rate of decline calculated as slope of straight line (shown here as absolute value) fitted to logarithms of monthly catch rates, beginning with January of best year.
≠ No significant decline.
* Significant (P = 0.05, or less).
** Highly significant (P = 0.01, or less)

totalling the numbers of hooks and fish shown in the Japanese data for each month and each area and dividing the number of fish by the number of hooks. Rates are expressed as catch per 100 hooks, to the nearest 0.1 fish.

YELLOWFIN TUNA

The mean catch rates for yellowfin for the 10 areas (ranked in decreasing order) are shown in Table 4. The mean rate was determined by adding the rates for all months in which fishing occurred in the area and dividing by the number of months.

The mean rate determined by this method can be affected by several factors. For instance, an area of good catches in which fishing began some years after 1956 could show an unusually high rate. For this reason, the rate for the best year is also shown. The "best year" was determined by adding the rates for all months in each year in which fishing occurred, and dividing by the number of months. The catch rate in the best year is undoubtedly affected by selective fishing - that is, fishing in an area in the most productive months and abandoning it when catch rates are low. Once fishermen have determine empirically the periods of high or low catches for a given area, they tend to follow the same pattern every year. This practice accounts for the reasonably good accord in the ranking by mean rates and by best years.

The rate of decline in apparent abundance of yellowfin tuna for each area is also shown in table 4. This rate is calculated from January (or the first month of fishing) of the best year as the slope of a straight line fitted to the logarithms of the monthly catch rates. If the correlation coefficient (r) was significant at the 0.05 level or better, the decline was accepted as real, otherwise it was rejected. Although time is neither bivariate nor distributed normally, we feel that this test indicates reasonably well the degree of relationship.

When rates of decline are calculated by this method, it should be borne in mind that similar rates do not necessarily reflect similarities in fishing success ; the bases on which the rates apply may be considerably different. Consider two areas with the same rate of decline, 0.010. If one of these starts at a rate of 10.0 fish per 100 hooks and the other at 5.0, after 5 years the catch rate in the first area will be 2.5 fish per 100 hooks, but the second will have a rate of only 1.0.

Predictably, significant rates of decline (i.e., with significant coefficients of correlation) were found for most of the areas. Rates of decline were 0.012 or higher for the Gulf of Guinea, North Oceanic (East), Cape Verde, Benguela, and North Oceanic (West) areas. Rates of decline were 0.008 or lower for the Guianas, Caribbean, and Bahia areas. The only areas which did not show significant declines were Florida and Rio de Janeiro, where the mean catch rates were lowest and there was little or no fishing before 1962.

Four of the five areas with high rates of decline are in the eastern Atlantic ; all of the areas with lower rates or no decline are in the western Atlantic. Four of the areas with high rates of decline are among the five most heavily fished ; four areas with lower (or no) rates of decline are in the five most lightly fished. This relationship would seem to establish almost indisputably that the observed declines are an effect of the long-line fishery. (Before 1961, the French surface fishery in the eastern Atlantic landed less

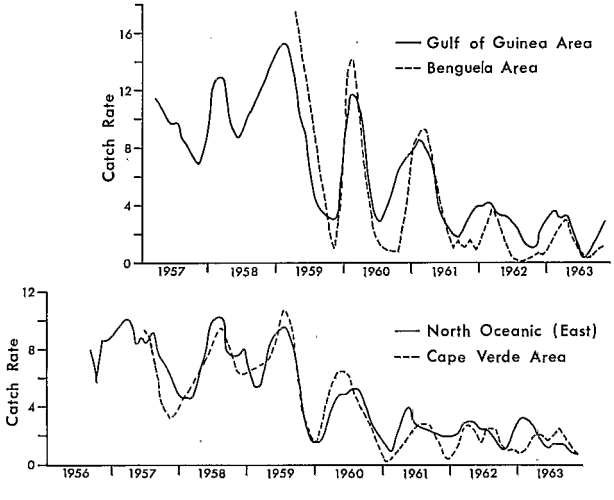

Fig. 2 Yellowfin tuna catch rates, 1956-1963, for Gulf of Guinea, Benguela, North Oceanic (East), and Cape Verde

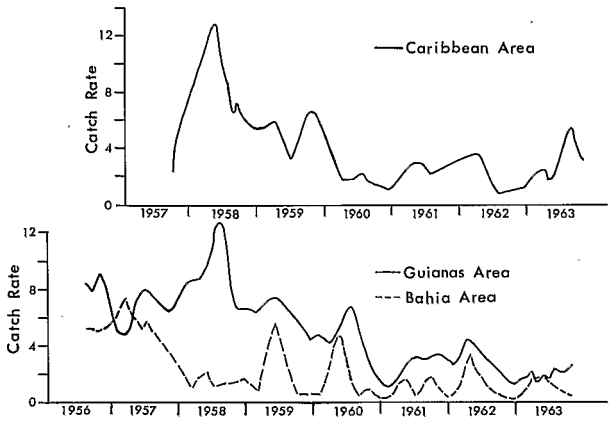

Fig. 3 Yellowin tuna catch rates, 1956-1963, for Caribbean, Guianas, and Bahia

than one-third the tonnage of yellowfin tuna landed by the Japanese long-line fishery - see FAO, 1966).

Most of the areas show cyclic changes in monthly catch rates, repeated more or less regularly, year after year, which suggest annual migrations of the yellowfin. This idea is supported by the following comparisons of catch rates in certain adjacent areas (Figures 2 and 3):

1. The Gulf of Guinea catch rate is similar to the Cape Verde catch rate six months later ($r = 0.633^{**}$, 43 d.f.).
2. The Gulf of Guinea and Benguela catch rates show similar fluctuations ($r = 0.911^{**}$, 36 d.f.).
3. The catch rates of the North Oceanic (East) and Cape Verde areas are related ($r = 0.846^{**}$, 53 d.f.).
4. The Caribbean catch rate is similar to the Guianas catch rate 3 months later ($r = 0.731^{**}$, 29 d.f.).
5. The Guianas and Bahia areas are related ($r = 0.452^{**}$, 50 d.f.).

The figures show catch rates smoothed by a moving average of three ; all calculations based on catch rates, however, were done with non-smoothed data.

Although the Gulf of Guinea and the Benguela areas are closely related, there is a striking tendency, in the first few years at least, for the Benguela area to show elevated catch rates in the high part of the cycle and reduced catch rates (approaching zero) in the lower part of the cycle. This tendency may be interpreted in terms of the oceanographic front off west Africa which has been shown to have such a marked effect on the surface fishery. When the front is present, it concentrates the fish and the catch rate rises ; when it retreats to the north, the yellowfin go with it (Le Guen, Poinsard and Troadec, 1965).

The lowest part of the Cape Verde cycle are lower than the corresponding parts of the Gulf of Guinea cycle in most years. This fact suggests that if the correspondence does reflect migration, a substantial residual population remains in the Gulf of Guinea.

The hypothesis of an annual migration from the Benguela and Gulf of Guinea areas into the Cape Verde and North Oceanic (East) areas is borne out by what is known of the oceanography of the eastern tropical Atlantic. The waters of the Gulf of Guinea and the southwest coast of Africa cool markedly from July to October of each year. (Although a similar cooling occurs in the Bahia and Rio de Janeiro areas during the southern winter, it does not seem so closely related to changes in apparent abundance of the yellowfin).

There are significant negative correlations between catch rates and catches in certain preceding years in the four most important yellowfin areas (Table 5). Taking R as catch rate and C as the catch in preceding years for which there is a significant correlation, we may say that for the four principal yellowfin areas :

$$R = a + bC$$

and

$C \approx \left(\frac{c_{-2} + c_{-3} + c_{-4}}{3}\right)$ for the Gulf of Guinea and North Oceanic (East) areas

$C \approx \left(\frac{c_{-2} + c_{-3}}{2}\right)$ for the Cape Verde area

$C = c_{-3}$ for the Guianas area

where c_{-1} is the catch 1 year before, c_{-2} is the catch 2 years before, etc.

This suggests that the catch rate of yellowfin may be maintained at any desired level in these areas by appropriate control of the catch.

Table 5. Coefficient of correlation between catch and catch rate for yellowfin tuna in four areas

Area	Catch rate : Same year	1 year later	2 years later	3 years later	4 years later	Degrees of freedom
GG	0.190	-0.463	-0.878**	-0.927**	-0.899**	5
CV	0.271	-0.417	-0.853*	-0.874**	-0.647	5
NOE	-0.381	-0.555	-0.728*	-0.909**	-0.835	6
GUI	0.227	-0.449	-0.466	-0.729*	-0.621	6

* Significant (P = 0.05, or less)
** Highly significant (P = 0.01, or less)

The catch rate consistent with maximum sustained yield is probably the most desirable level; determination of this rate is not considered here.

The annual cycles of apparent abundance in the western Atlantic are not nearly so clear-cut as those in the eastern Atlantic, nor does it seem possible to relate the western to the eastern cycles. In addition, North Oceanic (West) shows irregular fluctuations in catch rates, not clearly related to either the east or the west. This variation taken together with the differing rates of decline and the relations between catch and catch rate, suggests that the yellowfin tuna in the eastern Atlantic (Benguela, Gulf of Guinea, Cape Verde, North Oceanic (East) are distinct from those in the western Atlantic (Caribbean, Guianas, Bahia). Some mixing may occur in the North Oceanic (West) area.

Relation between long-line and surface fisheries for yellowfin tuna

The Atlantic surface tuna fishery, prosecuted primarily by live-bait vessels fishing along the west African coast (which started about 1955),

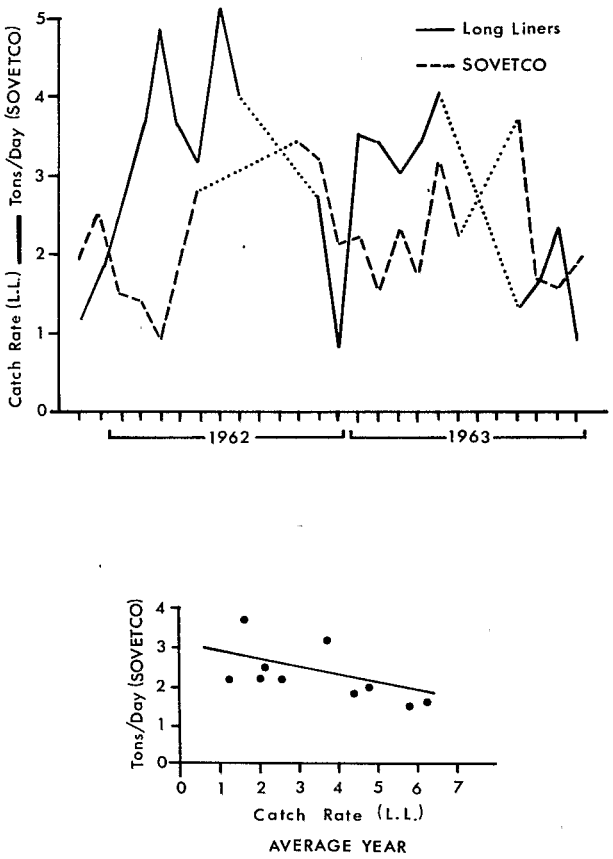

Fig. 4 Yellowfin tuna : comparison between catches by Japanese long-line and the Sovetco live-bait fleet on the west coast of Africa, 1961-1963.

had increased by 1963 to the point where it took nearly 30% of the total Atlantic catch of yellowfin (Shomura, 1966).

Partly because the surface fishery is carried on by several countries, collection and dissemination of catch and effort data are not as efficient as they are for the long-line fishery. Vilela and Monteiro (1959), and Le Guen, Poinsard and Troadec (1965), give some information, but the first series of data covering a considerable area for a number of years was only recently published by Postel (1965). He presents monthly catch and effort data for the French Sovetco fleet of 30 live-bait boats fishing along the west African coast from November 1961 through June 1964.

A direct comparison between the Japanese and French fisheries is difficult, principally because the French fishermen work mostly along the edge of the continental shelf whereas the Japanese fish farther offshore. Postel's Areas 3, 4, 5, and 6 (the region from Portuguese Guinea to Ghana, where about 80% of the reported catch and effort of the Sovetco fleet was concentrated) may be compared, however, with the long-line fishery between 0° and 15°W, north of the equator (Figure 4).

Japanese catches tend to be high when the French catches are low, and vice versa, but the data are still probably too few for a direct comparison. If one considers the average year, however, calculating the mean of the January catch rates for each fishery, the mean of the February catch rates and so on, an inverse relationship seems to exist ($r = -0.641^*$, 8 d.f.). This correlation raises the interesting possibility that the long-line and surface fisheries are exploiting the same fish, differentially available at different times of the year.

ALBACORE

The mean catch rates, catch rates in best years, and rates of decline for albacore, ranked in decreasing order of mean catch rate, are shown in Table 6. The rates were calculated in the same way as for yellowfin.

In spite of the general increase in apparent abundance of albacore (Table 2), the catch rate has actually decreased in the Bahia, North Oceanic (East), and Guianas areas. The rate of decline in the Bahia area is comparable to that of the more important areas of the yellowfin fishery ; North Oceanic (East) has a rate of decline comparable to the less important yellowfin areas ; the decline for the Guianas area is relatively slight.

Five of the six best areas for albacore are in the western Atlantic ; three of the four poorest areas are in the eastern Atlantic.

Many of the areas show cyclic changes in their monthly catch rates which suggest annual

migrations of the albacore. This idea is supported by comparison of certain adjacent areas (Figures 5 and 6).:

1. The Caribbean area is similar to the Bahia area 2 months later (r = 0.514**, 24 d.f.).
2. The Caribbean and Guianas areas show similar fluctuations in their catch rates (r = 0.390*, 34 d.f.).
3. Bahia and Rio de Janeiro are related (r = 0.453*, 22 d.f.).
4. The Cape Verde catch rate is related to the North Oceanic (East) catch rate 2 months later (r = 0.585**, 49 d.f.).

In the Cape Verde and North Oceanic (East) areas, the peak periods tend to occur around the first of the year, when there is a cooling of the upper layers of the ocean in this region. (The yellowfin cycle in the same areas drops to its lowest point around the turn of the year (Figure 2).)

The highest catch rates in the Caribbean and Guianas areas also tend to occur around the beginning of the year in most years. In the Guianas, however, the catch rate fluctuates less than in the Caribbean. This difference may be caused by a more nearly homogenous year-round temperature regime in the Guianas area. (Compare the Guianas

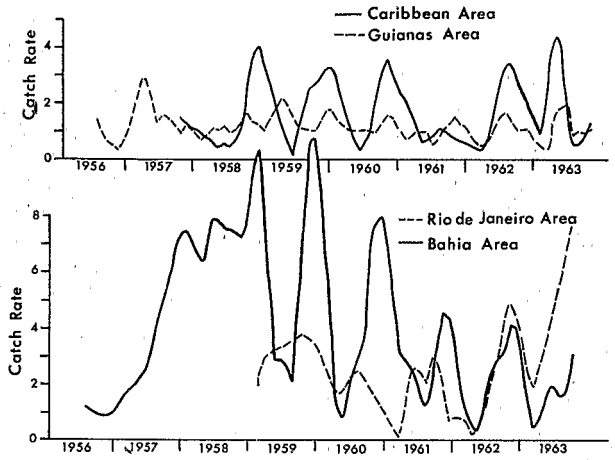

Fig. 5 Albacore catch rates, 1956-1963, Caribbean, Guianas, Rio de Janeiro, and Bahia.

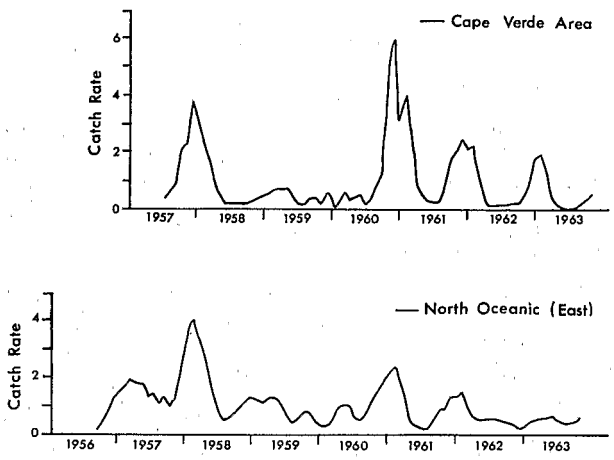

Fig.6 Albacore catch rates, 1956-1963, Cape Verde and North Oceanic (East)

Table 6. Catch rates and rates of decline for albacore, Japanese Atlantic long-line fishery, 1956-1963

Area	Mean catch rate	Catch rate, best year	Rate of decline [1]	Coeff. of correlation	Degrees of freedom
BAH	4.1	7.1 (1958)	0.011	-0.507**	57
FLA	3.1	3.1 (1962, 1963)	-	-	-
RIO	2.5	4.2 (1963)	-	-	-
NOW	2.2	2.7 (1963)	-	-	-
BEN	2.0	2.6 (1962)	≠	Positive slope	
CAR	1.8	2.2 (1960, 1962)	≠ fm. 1960	-0.048	23
GUI	1.2	1.6 (1957)	0.003	-0.309**	68
NOE	0.8	1.4 (1957)	0.007	-0.461**	66
CV	0.8	1.7 (1960)	≠	-0.207	36
GG	0.5	0.6 (1961)	≠	-0.279	29

1. Rate of decline calculated as slope of straight line (shown here as absolute value) fitted to logarithms of monthly catch rates, beginning with January of best year.
≠ No significant decline
* Significant (P = 0.05, or less)
** Highly significant (P = 0.01, or less)

curve for albacore in Figure 5 with the curve for yellowfin in the Guianas in Figure 3).

The relation between the albacore catch rate and the temperature of the upper layers of the ocean is much less clear for the Bahia and Rio de Janeiro areas. The catch rate would be expected to reach its peak in the southern winter at mid-year, but often it does not. The same lack of a clear relation between apparent abundance and oceanographic conditions was observed for the yellowfin in the same region.

COMPARISON BETWEEN CATCH RATES OF YELLOWFIN TUNA AND ALBACORE

Lima and Wise (1963), using information from Brazilian-based Japanese longliners from 1957 to 1961 (very likely some of the same data included in the present study), concluded that, "the abundance of yellowfin is generally higher but considerably more variable than that of albacore". This conclusion holds true for the present study, which covers a longer period and a much larger area.

Lima and Wise also concluded that, "the distributions of the two species are completely different...". This belief is borne out to some extent by our work ; comparison of the mean catch rates in Tables 4 and 5 makes it evident that the six best areas for albacore correspond to the six poorest areas for yellowfin, while the four poorest areas for albacore correspond to the four best areas for yellowfin.

In addition to differences between areas, time differences exist within several areas. In the Benguela and Bahia areas especially, and to a lesser degree in the Florida and Cape Verde areas, there has been a distinct tendency for the albacore catch rates to be highest when yellowfin catch rates were lowest. There can be little doubt that this inverse relation between catch rates is due to changing hydrographic conditions at various times of the year.

BIGEYE TUNA

The various rates for bigeye tuna, ranked in decreasing order of mean catch rate, are shown in Table 7.

In 9 of the 10 areas there has been no measurable decline. The Rio de Janeiro area shows a rate of decline more severe than has heretofore been observed. The nature of this decline is suspect, however, for when the data are examined year by year, it is obvious that there was a drop from over 4.0 fish per 100 hooks in 1961 and 1962, to less than 0.5 fish per 100 hooks in 1963. This drop coincided with a shift in fishing, from close to the Brazilian coast to much farther offshore and with a marked increase in the apparent abundance of albacore in the Rio de Janeiro area (Figure 5). If the rate of decline is calculated through 1962 only, it is not significant ($r = 0.198$, 13 d.f.).

It is probably nearer the fact, then, to say that no measurable decline of bigeye has occurred in any of the areas.

The two areas with the best mean catch rates, Rio de Janeiro and Benguela, are both well south of the equator.

Table 7. Catch rates and rates of decline for bigeye tuna, Japanese Atlantic long-line fishery, 1956-1963

Area	Mean catch rate	Catch rate, best year	Rate of decline	Coeff. of correlation	Degrees of freedom
RIO	2.8	4.7 (1961)	0.109	-0.795**	18
BEN	1.2	1.7 (1961)	≠	Positive slope	
CV	0.8	1.0 (1962)	≠	Positive slope	
NOE	0.5	1.0 (1963)	-		-
NOW	0.4	0.5 (1959)	≠	-0.084	25
GG	0.3	0.5 (1961)	≠	Positive slope	
GUI	0.3	0.4 (1962-1963)	-		-
CAR	0.2	0.5 (1962)		Positive slope	
BAH	0.2	0.4 (1963)	-		-
FLA	0.1	0.1 (1963)	-		-

1. Rate of decline calculated as slope of straight line (shown here as absolute value) fitted to logarithms of monthly catch rates, beginning in January of best year.
≠ No significant decline.
* Significant (P = 0.05, or less).
** Highly significant (P = 0.01, or less).

Although none of the relationships among fluctuations in the catch rate in the western Atlantic seem to suggest migration, various areas in the eastern Atlantic do show similarities.:

1. Fluctuations in the Cape Verde area resemble those in the North Oceanic (East) area 3 months later (r = 0.575**, 46 d.f.).
2. The catch rate in the Gulf of Guinea is closely related to that in Benguela (r = 0.411*, 36 d.f.) and to Cape Verde (r = 0.610**, 41 d.f.).

BLUE MARLIN

The catch rates and rates of decline for the 10 areas, ranked in order of decreasing catch rate, appear in Table 8.

Only the Bahia, Guianas, and North Oceanic (West) areas show significant rates of decline. The first two rates similar to the lower rates for yellowfin and albacore, but North Oceanic (West) has one of the highest rates observed. This area was one of the two most lightly fished in the 8-year period and was among the two or three most lightly fished in the period for which the decline was calculated. For this reason, the apparently severe decline is difficult to interpret. (Yellowfin also shows a relatively high decline in the same area).

The areas of highest abundance for blue marlin are off the coast of South America, principally off Brazil. The three best areas are Rio de Janeiro, Bahia, and Guianas. The catch rate in the Bahia area is closely related to the catch rate in the Rio de Janeiro area (r = 0.809**, 22 d.f.).

The catch rates for blue marlin even in the best areas, however, tend to be smaller by an order of magnitude than the catch rates in productive areas for the three principal species of tunas ; they are not sufficient in any area to support a commercial fishery.

Two areas which show rates of decline coincide with the best area for albacore (Bahia) and the second best area for yellowfin (Guianas), and show rates of decline comparable to the major species. These two areas are among the three best for blue marlin ; the third, Rio de Janeiro, is the best area for bigeye. Thus, the decline in catch rate of the blue marlin in two of the three most productive areas for this species is linked with intensive fisheries for albacore and yellowfin tuna in the same areas.

OTHER SPECIES

Mean catch rates by area for various species and groups of species are shown in Table 9. Mean catch rates were calculated as for the principal species.

Because of the low rates, never as high as 1.0 fish per 100 hooks, yearly catch rates and rates of decline were not calculated.

White Marlin

The apparent abundance of white marlin was highest in the Bahia area. The Florida, Caribbean,

Table 8. Catch rates of decline for blue marlin, Japanese Atlantic long-time fishery, 1956-1963

Area	Mean catch rate	Catch rate, best year	Rate of decline [1]	Coeff. of correlation	Degrees of freedom
RIO	0.4	1.1 (1959)	≠	Positive slope	
BAH	0.4	0.9 (1958)	0.008	-0.308*	57
GUI	0.2	0.5 (1956)	0.007	-0.314**	74
FLA	0,2	0.3 (1963)	-	-	-
CAR	0.2	0.3 (1962)	≠	-0.240	12
NOW	0.2	0.3 (1961)	0.040	-0.626**	15
NOE	0.1	0.3 (1957)	≠	-0.136	66
GG	0.1	0.2 (1957, 1958)	≠ fm. 1957	-0,013	63
CV	0.1	0.2 (1957, 1962, 1963)	-	-	-
BEN	0.1	0.1 (1960-1963)	-	-	-

1. Rate of decline calculated as slope of straight line (shown here as absolute value) fitted to logarithms of monthly catch rates, begining with January of best year.
≠ No significant decline.
* Significant (P = 0.05, or less)
** Highly significant (P = 0.01, or less).

and Benguela areas are next in order. This distribution suggests that the species is more concentrated in the western than in the eastern Atlantic. The very low catch rate in the Gulf of Guinea (about 0.01 fish per 100 hooks) and Guianas (less than 0.1 fish per 100 hooks), both equatorial areas, suggests avoidance of warmer water. (The situation is somewhat complicated by the inclusion of striped marlin in the "white marlin" category in 1963, but the pre-1963 statistics show essentially the same distribution).

Black Marlin

Apparent abundance of black marlin was lowest of all the species studied. It reached 0.1 per 100 hooks on only three occasions : in January and February 1961 in the Bahia area, and in December 1962 in the Rio de Janeiro area. Black marlin was completely absent from catches in the Caribbean, and only a single fish was recorded from the North Oceanic (West) area. In all other areas, the overall catch was less than 0.01 fish per 100 hooks.

Other Marlins

The category "other marlins" seems to have been used in the Japanese reports for species not otherwise covered. Its exact composition is not always clear ; through 1962 it probably included striped marlin, sailfish, and spearfishes. In 1963 it included only sailfish and spearfishes. The catch rate was remarkably consistent ; in 8 of the 10 areas, the overall average rate was 0.1 per 100 hooks.

Bluefin Tuna

The apparent abundance of the bluefin was very low, rising to 0.1 per 100 hooks in only two areas, Bahia and North Oceanic (East). Relatively good catches were made in certain periods in each of these areas - Bahia in March, April, and October and North Oceanic (East) in September, October, and November. This rate was also occasionally reached in the Guianas area in March, April, and November. The extremely low catch rates in the Gulf of Guinea, Caribbean, and North Oceanic (West) areas are of interest from the ecological point of view. The catch rate in the North Oceanic (West) area was especially low ; only an estimated 152 fish were caught in the 8 years, and the catch rate was well under 0.01 fish per 100 hooks.

Swordfish

Apparent abundance of swordfish reached 0.1 per 100 hooks in only one area, Rio de Janeiro. Some caution should be observed in interpreting swordfish catch data which do not include information as to time of day, because long-line catches of swordfish are usually much better during the night. The tuna long-liners fish almost entirely during the day, however.

Three adjacent areas - Guianas, Caribbean, and Florida - show especially low catch rates of only about 0.01 fish per 100 hooks. These low rates suggest a tropical hiatus in the distribution of swordfish along the American coasts, since long-lining for swordfish is carried out by U.S. and other fishermen north of the Florida area.

RELATION BETWEEN FISHING EFFORT AND FISHING SUCCESS

The Japanese long-line fleet exercised considerable selectivity in the geographical distribution of its fishing (see Appendix, Table A.9). The fishermen concentrated heavily in some areas

Table 9. Mean catch rates by area for miscellaneous species and groups, Japanese Atlantic long-line fishery, 1956-1963 ("O.O." means a catch of 0.05 fish per 100 hooks, or less)

Area	White marlin	Black marlin	Other marlins	Bluefin	Swordfish
BAH	0.3	0.0	0.1	0.1	0.0
GG	0.0	0.0	0.1	0.0	0.0
NOE	0.1	0.0	0.1	0.1	0.0
CV	0.1	0.0	0.1	0.0	0.0
BEN	0.2	0:0	0.1	0.0	0.0
GUI	0.0	0.0	0.1	0.0	0.0
FLA	0.2	0.0	0.0	0.0	0.0
NOW	0.1	0.0	0.0	0.0	0.0
CAR	0.2	0.0	0.1	0.0	0.0
RIO	0.1	0.0	0.1	0.0	0.0

seasonally, largely or completely abandoning other areas. This behaviour was undoubtedly due to practical observations of concentrations of catchable fish, and should have resulted in greater catches than those resulting from randomly distributed effort.

We employed rank correlation to compare the relation between distribution of fishing effort and of catch rates. The relation between fishing effort and catch rate for each year, for all fish combined, for yellowfin, yellowfin and albacore, bigeye, and blue marlin is shown in Table 10.

Although no correlation was found between fishing effort and catch rate for all fish combined for either of the first 2 years, the correlation was positive for 5 of the last 6 years. We believe that a good portion of the effort in the first 2 years was exploratory and that favorable results in following years were attributable to this exploration.

Fishing was concentrated in areas of high catch rate for yellowfin in 1958-1961. Although fishing in 1962 and 1963 apparently was not concentrated for high catches of yellowfin, there are positive correlations for both these years when the combined yellowfin-albacore catch rate is considered. This correlation probably reflects the evolution of the fishery from a concentration on yellowfin to a mixed fishery for yellowfin and albacore when albacore catches equalled or exceeded yellowfin catches and the catch rates for the two species became approximately equal (Table 2).

Correlation between catch rates of bigeye and blue marlin, and fishing effort, was usually lacking ; fishing was normally concentrated in areas of low catch rates for these species. We hold that catches of species other than yellowfin tuna and albacore were incidental to directed fishing for the two principal species.

SUMMARY AND CONCLUSION

The Japanese Atlantic long-line fishery, which began on a commercial scale in 1957 when over 3 million hooks were set, had increased by 1963 to over 55 million hooks. The principal species caught were yellowfin tuna, albacore, bigeye tuna, and blue marlin. The yellowfin and blue marlin catch rates declined during the period ; all other species either showed no measurable change, or increased.

We divided the Atlantic into 10 areas and analyzed effort and catch statistics separately for each species in each area. During the first few years of the fishery, the effort was concentrated in the eastern Atlantic, but by 1962 it had become much more dispersed.

Yellowfin declined in 8 of the 10 areas. Rates of decline were generally higher in the eastern Atlantic in the most heavily fished areas. Cyclic changes in catch rates, which can be followed from one area to another, may indicate migrations of the yellowfin associated with oceanographic changes. Catch rate and catch in preceding years are related, which suggests that appropriate control of catch could maintain catch rates at a desirable level. The long-line and surface fisheries for yellowfin along the west African coast may be fishing on the same stocks.

Marked differences are found in all cases when rates of decline, presumed migration patterns, and catch rate vs. catch relations are compared for eastern and western Atlantic yellowfin. We believe that the yellowfin populations of the eastern and western Atlantic are separate.

Albacore showed declines, generally less than those of yellowfin, in 3 of the 10 areas. Cyclic variations in catch rates suggest migrations for this species also.

The distribution of yellowfin and albacore

Table 10. Correlation between fishing effort and catch rate in the Japanese Atlantic long-line fishery, 1956-1963

Year	All fish	Yellowfin	Yellowfin and Albacore	Bigeye	Blue Marlin
1956	0	0	0	0	0
1957	0	0	0	0	0
1958	+	+	+	0	0
1959	+	+	+	0	0
1960	+	+	+	0	+
1961	+	+	+	0	0
1962	0	0	+	0	0
1963	+	0	+	0	+

0, no correlation between fishing effort and catch rate.
+ positive correlation between fishing effort and catch rate.

appear to be inversely related, both in time and in space.

Little or no decline was found for bigeye. Certain areas show related changes in catch rate, but presumed migrations are not evident.

Blue marlin declined in three areas, two of them off the coast of South American, where this species appears to be concentrated. Catch rates for blue marlin tended to be an order of magnitude less than catch rates for the principal species.

Catch rates for all other species were much lower even than those of blue marlin.

When concentrations of fishing effort are compared with catch rates, it is apparent that the fishery was directed at yellowfin and albacore, and that other species were caught incidentally.

Acknowledgement. We thank Mrs Gabrielle M. Ranallo for her painstaking work in assisting with tabulations and calculations, and for drafting the figures in this paper.

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APPENDIX

This Appendix contains detailed tables of catch per 100 hooks by month and area for the following species : Yellowfin tuna (A.1), Albacore (A.2), Bigeye tuna (A.3), Blue marlin (A.4), White marlin (A.5), Other marlins (A.6), Bluefin tuna (A.7), Swordfish (A.8). In A.1 to A.8 Tables "-" signifies no fishing, and "0.0" signifies a catch rate of 0.05 or less.

Table A.9 shows fishing effort by month and area.

Table A.1. Yellowfin tuna catch per 100 hooks by month area

Year	Month	GG	GUI	NOE	CV	BEN	CAR	NOW	BAH	RIO	FLA
1956	June	-	9.4	-	-	-	-	-	-	-	-
	July	-	-	-	-	-	-	-	5.3	-	-
	Aug.	-	7.1	14.3	-	-	-	-	-	-	-
	Sept.	-	9.1	0.0	-	-	-	-	-	-	-
	Oct.	-	7.3	9.4	-	-	-	-	-	-	-
	Nov.	-	11,6	8.1	-	-	-	-	-	-	-
	Dec.	-	12.7	-	-	-	-	-	5.0	-	-
1957	Jan.	-	-	-	-	-	-	-	-	-	-
	Feb.	11.2	-	-	-	-	-	-	-	-	-
	March	12.8	-	-	-	-	-	-	-	-	-
	Apr.	10.5	4.4	10.6	-	-	-	-	8.1	-	-
	May	10.2	10.9	8.7	-	-	-	-	3.6	-	-
	June	10.4	6.6	6.1	7.8	-	-	-	6.2	-	-
	July	8.7	7.2	11.7	9.0	-	-	-	-	-	-
	Aug.	10.2	8.7	8.1	11.5	-	-	-	-	-	-
	Sept.	7.5	5.9	7.8	5.9	-	1.7	-	-	-	-
	Oct.	7.4	7.2	6.8	3.2	-	-	0.1	-	-	-
	Nov.	7.4	6.8	6.7	3.0	-	-	-	-	-	-
	Dec.	5.9	5.3	5.4	-	-	-	-	-	-	-
1958	Jan.	11.0	8.5	3.8	-	-	-	-	-	-	-
	Feb.	14.2	-	-	-	-	-	-	1.8	-	-
	March	13.3	-	-	-	-	-	-	0.7	-	-
	Apr.	11.1	-	-	-	-	-	-	0.8	-	-
	May	7.9	8.9	-	6.8	-	-	-	4.1	-	-
	June	-	8.4	8.6	8.5	-	13.3	-	1.2	-	-
	July	-	10.5	12.2	8.8	-	13.7	-	-	-	-
	Aug.	-	13.9	9.8	-	-	2.8	-	-	-	-
	Sept.	-	11.6	8.5	10.4	-	9.1	-	-	-	-
	Oct.	-	8.6	5.2	6.4	-	-	-	-	-	-
	Nov.	-	5.9	9.3	6. 3	-	7.5	-	-	-	-
	Dec.	-	5.9	8.5	-	-	-	4.5	-	-	-
1959	Jan.	15.1	8.1	6.4	-	-	-	7.5	1.7	-	-
	Feb.	15.6	5.9	4.2	-	-	-	-	0.8	0.3	-
	March	15.4	4.8	-	-	20.2	-	-	1.0	-	-
	Apr.	12.2	8.3	7.2	-	-	5.5	-	1.0	-	-
	May	10.8	7.5	10.8	7.3	-	6.6	-	6.7	-	-
	June	7.0	6.8	8.5	9.1	-	5.4	3.4	5.6	-	-
	July	-	7.6	8.8	11.4	-	2.1	-	-	-	-
	Aug.	-	6.3	11.5	11.9	-	2.9	-	-	-	-
	Sept.	2,7	5.2	6.6	7.8	-	-	6.6	1.1	-	-
	Oct.	3.5	6.6	4.4	5.3	-	-	-	0.5	-	-
	Nov.	3.1	4.2	2.5	2.8	0.6	6.7	4.1	0.2	-	-
	Dec.	2.7	4.7	2.7	0.3	0.3	8.2	2.3	0.5	0.1	-

Table A.1 (cont.)

Year	Month	GG	GUI	NOE	CV	BEN	CAR	NOW	BAH	RIO	RIO
1960	Jan.	10.7	3.9	0.2	-	12.4	4.9	1.5	0.5	-	-
	Feb.	13.1	5.8	-	-	18.4	-	-	0.8	-	-
	March	11.7	-	-	-	11.8	-	-	0.4	-	-
	Apr.	8.7	3.0	5.2	6.4	-	-	-	3.1	-	-
	May	6.6	5.1	4.4	7.4	1.5	-	-	6.5	-	-
	June	1.9	7.3	5.0	6.0	-	1.0	-	4.5	0.4	-
	July	-	6.4	4.9	6.1	-	2.8	-	2.9	-	-
	Aug.	-	6.9	6.0	5.6	-	1.8	7.6	0.1	0.3	-
	Sept.	-	4.7	5.0	2.8	-	1.9	4.2	0.1	-	-
	Oct.	-	3.1	2.7	-	0.8	0.9	1.1	1.3	-	-
	Nov.	7.1	2.9	2.7	3.4	1.2	1.7	1.6	1.0	-	-
	Dec.	8.0	-	-	0.1	9.7	1.4	-	0.3	-	-
1961	Jan.	7.4	-	-	-	5.2	0.9	-	0.3	-	-
	Feb.	8.4	0.6	-	-	9.9	-	-	0.4	-	-
	March	10.1	1.3	0.3	-	10.1	-	-	0.3	-	-
	Apr.	6.0	-	5.6	0.9	8.4	-	-	1.1	8.4	-
	May	4.4	2.0	3.6	2.4	5.1	-	-	2.8	13.5	-
	June	3.0	3.0	2.7	2.5	4.5	3.7	-	0.8	0.0	-
	July	2.6	3.3	2.3	2.6	1.0	2.1	0.5	0.5	0.0	-
	Aug.	-	3.7	2.9	3.5	2.1	-	0.8	0.1	0.0	-
	Sept.	1.5	2.6	2.3	2.6	0.2	-	-	-	-	-
	Oct.	2.3	3.4	2.3	2.5	2.1	-	2.2	2.7	0.0	-
	Nov.	4.3	3.5	2.3	0.8	1.2	-	-	0.7	0.0	-
	Dec.	3.5	3.7	1.8	0.3	1.5	-	-	0.2	0.1	-
1962	Jan.	4.4	-	1.9	0.3	0.4	-	-	0.7	-	-
	Feb.	4.1	-	-	-	3.6	-	-	0.3	0.1	-
	March	4.2	1.9	-	-	4.4	-	-	0.8	0.7	-
	Apr.	3.5	4.4	3.6	4.2	3.1	-	-	2.0	2.7	-
	May	2.9	5.2	2.3	1.3	-	3.7	-	4.9	0.1	0.2
	June	3.9	4.4	2.8	2.1	0.3	2.9	1.4	3.2	0.7	0.9
	July	2.6	3.7	2.3	1.7	0.1	0.9	0.9	1.4	-	0.3
	Aug.	-	2.6	2.5	4.1	0.1	0.7	2.1	-	-	0.2
	Sept.	-	3.6	1.4	2.1	0.2	-	2.6	0.6	-	0.3
	Oct.	0.6	3.1	0.9	1.5	0.5	-	1.8	0.9	-	1.0
	Nov.	1.8	1.5	1.1	0.7	0.6	-	2.0	0.3	0.1	-
	Dec.	1.7	-	3.5	-	0.9	-	-	0.3	0.3	-
1963	Jan.	4.5	-	3.0	1.5	0.7	-	-	0.3	0.1	-
	Feb.	3.4	1.1	-	0.2	1.6	1.5	-	0.2	0.1	-
	March	3.1	2.8	3.0	1.6	3.2	3.2	-	1.7	0.2	-
	Apr.	3.1	1.4	2.3	3.7	-	-	0.9	1.2	-	-
	May	3.9	2.3	1.2	1.4	2.8	1.8	0.5	2.2	0.1	0.5
	June	0.0	0.6	1.3	1.2	0.7	1.0	0.3	-	-	0.3
	July	-	2.5	1.1	2.7	0.3	4.0	0.4	1.4	-	0.7
	Aug.	-	2.1	2.2	2.6	0.8	6.0	0.6	-	-	5.6
	Sept.	1.3	2.4	1.0	2.6	0.1	5.4	0.8	0.6	-	-
	Oct.	1.5	1.9	0.9	0.9	0.6	5.4	1.3	1.0	-	-
	Nov.	4.0	2.0	0.8	0.9	1.9	2.6	1.1	0.3	-	2.6
	Dec.	3.5	3.8	0.6	1.0	1.2	1.6	-	0.2	0.1	5.8

Table A.2 Albacore Catch per 100 hooks by month and area

Year	Month	GG	GUI	NOE	CV	BEN	CAR	NOW	BAH	RIO	FLA
1956	June	-	1.9	-	-	-	-	-	-	-	-
	July	-	-	-	-	-	-	-	1.4	-	-
	Aug.	-	0.9	0.4	-	-	-	-	-	-	-
	Sept.	-	0.6	0.1	-	-	-	-	-	-	-
	Oct.	-	0.3	0.0	-	-	-	-	-	-	-
	Nov.	-	0.5	1.2	-	-	-	-	-	-	-
	Dec.	-	0.5	-	-	-	-	-	0.8	-	-
1957	Jan.	-	-	-	-	-	-	-	-	-	-
	Feb.	0.9	-	-	-	-	-	-	-	-	-
	March	1.4	-	-	-	-	-	-	-	-	-
	Apr.	0.4	3.7	2.0	-	-	-	-	1.8	-	-
	May	1.0	1.7	1.6	-	-	-	-	2.5	-	-
	June	0.3	1.1	1.8	0.2	-	-	-	1.9	-	-
	July	0.1	1.3	0.4	0.1	-	-	-	-	-	-
	Aug.	0.3	2.3	1.9	0.9	-	-	-	-	-	-
	Sept.	0.3	0.7	1.1	1.2	-	1.6	-	-	-	-
	Oct.	0.2	0.8	0.9	0.6	-	-	1.5	-	-	-
	Nov.	0.6	1.4	1.0	4.5	-	-	-	-	-	-
	Dec.	0.4	1.6	1.6	-	-	-	-	-	-	-
1958	Jan.	0.4	0.5	4.5	-	-	-	-	-	-	-
	Feb.	0.4	-	-	-	-	-	-	8.1	-	-
	March	0.5	-	-	-	-	-	-	6.9	-	-
	Apr.	0.8	-	-	-	-	-	-	6.4	-	-
	May	0.3	1.3	-	0.2	-	-	-	6.0	-	-
	June	-	1.0	1.4	0.2	-	0.4	-	8.1	-	-
	July	-	1.2	0.4	0.2	-	0.9	-	-	-	-
	Aug.	-	0.9	0.7	-	-	0.3	-	-	-	-
	Sept.	-	1.3	0.5	0.2	-	0.8	-	-	-	-
	Oct.	-	1.8	0.5	0.1	-	-	-	-	-	-
	Nov.	-	1.8	1.6	0.3	-	4.6	-	-	-	-
	Dec.	-	0.6	1.1	-	-	-	2.1	-	-	-
1959	Jan.	0.3	1.4	1.2	-	-	-	2.5	7.1	-	-
	Feb.	0.7	1.3	1.3	-	-	-	-	8.9	2.9	-
	March	1.1	2.5	-	-	2.1	-	-	11.8	-	-
	Apr.	0.9	2.2	0.9	-	-	1.5	-	10.2	-	-
	May	1.1	2.4	1.8	0.8	-	0.4	-	2.6	-	-
	June	0.3	1.3	1.1	0.5	-	0.2	2.9	3.1	-	-
	July	-	1.1	0.3	0.0	-	0.1	-	-	-	-
	Aug.	-	1.3	0.1	0.0	-	2.5	-	-	-	-
	Sept.	0.3	1.0	0.7	0.7	-	-	0.7	2.5	-	-
	Oct.	0.5	0.9	1.1	0.4	-	-	-	1.4	-	-
	Nov.	0.1	1.3	0.5	0.2	4.3	2.8	1.5	10.2	-	-
	Dec.	0.0	2.3	0.6	0.0	0.0	3.6	2.7	11.1	3.9	-

Table A.2 (cont.)

Year	Month	GG	GUI	NOE	CV	BEN	CAR	NOW	BAH	RIO	FLA
1960	Jan.	0.2	1.7	0.1	-	0.0	3.5	3.9	10.9	-	-
	Feb.	0.6	1.3	-	-	0.1	-	-	10.3	-	-
	March	0.7	-	-	-	0.2	-	-	7.5	-	-
	Apr.	0.7	1.3	0.5	0.1	-	-	-	2.4	-	-
	May	1.3	0.8	1.7	0.7	0.0	-	-	0.7	-	-
	June	0.0	1.3	0.8	0.5	-	0.1	-	0.8	1.3	-
	July	-	1.3	0.6	0.2	-	0.3	-	1.2	-	-
	Aug.	-	0.7	0.3	0.0	-	2.3	0.9	4.0	2.8	-
	Sept.	-	0.9	0.5	1.1	-	0.7	0.9	1.9	-	-
	Oct.	-	1.4	1.0	-	6.7	4.3	0.7	3.5	-	-
	Nov.	0.0	1.8	1.6	1.8	6.3	4.6	1.3	6.4	-	-
	Dec.	0.0	-	-	9.3	0.0	1.9	-	8.6	-	-
1961	Jan.	0.1	-	-	-	0.0	2.7	-	8.3	-	-
	Feb.	0.6	0.8	-	-	0.9	-	-	7.1	-	-
	March	0.9	0.6	2.7	-	0.2	-	-	4.6	-	-
	Apr.	1.0	-	0.7	0.0	0.1	-	-	3.3	0.1	-
	May	0.7	1.5	0.4	0.1	0.2	-	-	1.7	0.1	-
	June	0.7	0.5	0.2	0.3	0.6	0.2	-	3.9	2.2	-
	July	0.8	0.9	0.2	0.4	0.8	1.2	4.1	2.3	4.9	-
	Aug.	-	0.5	0.2	0.3	1.1	-	0.0	0.6	0.7	-
	Sept.	0.0	1.1	0.3	0.2	5.3	-	-	-	-	-
	Oct.	1.6	2.1	0.9	2.0	2.3	-	0.6	1.9	3.6	-
	Nov.	0.0	1.1	1.5	2.9	1.3	-	-	3.5	3.5	-
	Dec.	0.1	1.6	0.3	1.1	3.9	-	-	5.1	1.4	-
1962	Jan.	0.4	-	2.0	3.3	6.4	-	-	5.1	-	-
	Feb.	0.3	-	-	-	0.7	-	-	3.1	0.1	-
	March	0.5	0.3	-	-	0.1	-	-	1.9	1.7	-
	Apr.	0.3	0.6	0.4	0.1	0.2	-	-	0.9	0.5	-
	May	0.1	0.9	0.4	0.0	-	0.3	-	0.5	0.1	2.2
	June	0.6	0.9	0.6	0.1	0.0	1.6	3.5	0.4	0.2	3.5
	July	1.0	1.5	0.5	0.1	1.3	3.1	4.4	0.2	-	5.1
	Aug.	-	2.5	0.5	0.0	4.9	3.8	2.7	-	-	3.7
	Sept.	-	1.2	0.5	0.1	5.3	-	1.1	4.3	-	2.4
	Oct.	1.2	0.7	0.3	0.5	3.3	-	1.6	1.8	-	1.9
	Nov.	0.5	1.4	0.4	0.0	2.7	-	1.1	3.2	4.1	-
	Dec.	0.9	-	0.2	-	3.2	-	-	4.5	5.9	-
1963	Jan.	0.1	-	0.1	1.6	5.4	-	-	5.0	4.8	-
	Feb.	0.2	0.5	-	3.1	0.2	1.1	-	2.8	3.3	-
	March	0.4	0.5	0.7	1.0	0.1	0.3	-	0.9	1.7	-
	Apr.	0.5	0.3	0.4	0.2	-	-	0.8	0.5	-	-
	May	0.2	0.8	0.5	0.1	1.1	6.5	3.1	0.2	2.4	7.4
	June	0.0	4.3	0.7	0.0	0.5	3.3	5.3	-	-	5.4
	July	-	0.5	0.7	0.0	3.9	0.2	5.0	2.7	-	4.2
	Aug.	-	1.2	0.2	0.0	3.7	0.7	3.5	-	-	1.4
	Sept.	0.6	0.9	0.3	0.1	3.5	0.9	1.5	1.0	-	-
	Oct.	0.6	1.0	0.4	0.6	2.5	0.3	2.1	2.0	-	-
	Nov.	0.0	1.0	0.6	0.2	2.1	1.5	0.6	2.3	-	0.1
	Dec.	0.0	1.3	0.6	0.6	2.4	2.0	-	5.1	8.6	0.2

Table A.3 Bigeye tuna Catch per 100 hooks by month and area

Year	Month	GG	GUI	NOE	CV	BEN	CAR	NOW	BAH	RIO	FLA
1956	June	-	0.2	-	-	-	-	-	-	-	-
	July	-	-	-	-	-	-	-	0.1	-	-
	Aug.	-	0.1	0.1	-	-	-	-	-	-	-
	Sept.	-	0.0	0.1	-	-	-	-	-	-	-
	Oct.	-	0.1	0.2	-	-	-	-	-	-	-
	Nov.	-	0.1	0.0	-	-	-	-	-	-	-
	Dec.	-	0.2	-	-	-	-	-	0.1	-	-
1957	Jan.	-	-	-	-	-	-	-	-	-	-
	Feb.	0.5	-	-	-	-	-	-	-	-	-
	Mar.	0.0	-	-	-	-	-	-	-	-	-
	Apr.	0.0	1.1	0.2	-	-	-	-	0.1	-	-
	May	0.1	0.1	0.3	-	-	-	-	0.2	-	-
	June	0.1	0.2	0.4	0.3	-	-	-	0.1	-	-
	July	0.2	0.2	0.3	0.6	-	-	-	-	-	-
	Aug.	0.2	0.2	0.3	0.3	-	-	-	-	-	-
	Sept.	0.2	0.1	0.3	0.3	-	0.0	-	-	-	-
	Oct.	0.2	0.1	0.3	0.6	-	-	0.1	-	-	-
	Nov.	0.3	0.1	0.4	2.3	-	-	-	-	-	-
	Dec.	0.3	0.3	0.4	-	-	-	-	-	-	-
1958	Jan.	0.3	0.1	0.4	-	-	-	-	-	-	-
	Feb.	0.1	-	-	-	-	-	-	0.2	-	-
	Mar.	0.0	-	-	-	-	-	-	0.0	-	-
	Apr.	0.0	-	-	-	-	-	-	0.0	-	-
	May	0.2	0.2	-	0.2	-	-	-	0.2	-	-
	June	-	0.3	0.3	0.2	-	0.1	-	0.2	-	-
	July	-	0.1	0.3	0.2	-	0.1	-	-	-	-
	Aug.	-	0.1	0.5	-	-	0.0	-	-	-	-
	Sept.	-	0.1	0.2	0.6	-	0.0	-	-	-	-
	Oct.	-	0.0	0.3	0.8	-	-	-	-	-	-
	Nov.	-	0.1	0.0	0.8	-	0.0	-	-	-	-
	Dec.	-	0.1	0.4	-	-	-	0.2	-	-	-
1959	Jan.	0.2	0.2	0.8	-	-	-	0.0	0.1	-	-
	Feb.	0.0	0.2	0.0	-	-	-	-	0.1	0.0	-
	Mar.	0.0	0.0	-	-	0.0	-	-	0.0	-	-
	Apr.	0.0	0.3	0.0	-	-	0.2	-	0.0	-	-
	May	0.1	0.1	0.2	0.4	-	0.0	-	0.4	-	-
	June	0.1	0.2	0.1	0.2	-	0.1	0.3	0.1	-	-
	July	-	0.0	0.4	0.4	-	1.0	-	-	-	-
	Aug.	-	0.0	0.1	0.5	-	0.0	-	-	-	-
	Sept.	0.0	0.7	0.6	0.5	-	-	1.3	0.1	-	-
	Oct.	0.5	0.5	0.3	0.5	-	-	-	0.2	-	-
	Nov.	0.8	0.3	0.5	1.5	0.0	0.3	0.4	0.2	-	-
	Dec.	1.2	0.3	0.6	3.6	0.0	0.2	0.4	0.1	0.1	-

Table A.3 (Cont.)

Year	Month	GG	GUI	NOE	CV	BEN	CAR	NOW	BAH	RIO	FLA
1960	Jan.	0.1	0.5	0.0	-	0.4	0.1	0.8	0.1	-	-
	Feb.	0.1	0.6	-	-	0.1	-	-	0.0	-	-
	Mar.	0.1	-	-	-	0.1	-	-	0.0	-	-
	Apr.	0.1	1.0	0.6	0.3	-	-	-	0.2	-	-
	May	0.3	0.0	0.4	0.5	0.6	-	-	0.2	-	-
	June	0.0	0.1	0.5	0.8	-	0.1	-	0.1	0.2	-
	July	-	0.1	0.4	0.7	-	0.0	-	0.3	-	-
	Aug.	-	0.1	0.8	0.6	-	0.3	0.2	0.1	0.0	-
	Sept.	-	0.1	0.6	0.6	-	1.6	0.4	0.0	-	-
	Oct.	-	0.1	0.3	-	0.5	0.1	0.6	0.3	-	-
	Nov.	0.4	0.3	0.4	0.4	0.8	0.0	0.0	0.3	-	-
	Dec.	0.4	-	-	0.2	0.9	0.0	-	0.1	-	-
1961	Jan.	0.2	-	-	-	0.4	0.0	-	0.2	-	-
	Feb.	0.1	0.0	-	-	0.3	-	-	0.1	-	-
	Mar.	0.2	0.0	0.0	-	0.3	-	-	0.1	-	-
	Apr.	0.3	-	0.7	0.9	0.6	-	-	0.3	2.4	-
	May	0.4	0.2	0.5	1.1	0.4	-	-	0.4	1.3	-
	June	0.6	0.3	0.6	0.8	1.7	0.1	-	0.3	8.3	-
	July	0.7	0.1	0.6	1.3	3.7	0.0	0.1	0.3	5.2	-
	Aug.	-	0.3	1.3	1.3	4.8	-	0.0	0.2	3.2	-
	Sept.	1.1	0.5	1.3	0.8	3.3	-	-	-	-	-
	Oct.	0.6	0.2	0.4	0.3	2.0	-	0.4	0.5	6.7	-
	Nov.	0.4	0.3	0.5	0.8	2.0	-	-	0.4	7.5	-
	Dec.	0.4	0.6	0.9	0.5	1.0	-	-	0.1	2.8	-
1962	Jan.	0.3	-	0.2	0.0	0.2	-	-	0.1	-	-
	Feb.	0.4	-	-	-	0.9	-	-	0.0	9.1	-
	Mar.	0.2	0.8	-	-	0.4	-	-	0.1	4.0	-
	Apr.	0.2	0.1	0.3	0.8	0.3	-	-	0.2	0.4	-
	May	0.9	0.3	0.5	2.3	-	2.0	-	0.3	8.2	0.0
	June	0.3	0.2	0.4	0.8	1.8	0.1	0.4	0.2	8.7	0.1
	July	0.3	0.6	1.6	1.0	2.3	0.0	0.1	0.1	-	0.0
	August.	-	0.4	1.6	1.0	2.6	0.0	0.3	-	-	0.0
	Sept.	-	0.3	0.6	0.9	3.5	-	0.5	0.6	-	0.0
	Oct.	0.3	0.2	0.6	0.8	2.0	-	0.5	0.6	-	0.0
	Nov.	0.3	0.4	1.0	1.2	0.9	-	0.7	0.2	0.0	-
	Dec.	0.6	-	0.7	-	0.4	-	-	0.2	0.0	-
1963	Jan.	0.3	-	0.8	0.6	0.1	-	-	0.2	0.0	-
	Feb.	0.2	0.3	-	0.7	0.8	0.2	-	0.1	0.0	-
	Mar.	0.2	0.3	0.6	0.7	0.3	0.1	-	0.2	0.0	-
	Apr.	0.3	0.3	0.6	0.7	-	-	0.8	0.2	-	-
	May	0.5	0.4	1.1	1.6	0.4	0.0	0.2	0.5	0.2	0.0
	June	0.2	0.2	1.0	0.1	1.2	0.1	0.1	-	-	0.0
	July	-	0.5	1.9	0.7	1.7	0.1	0.1	1.6	-	0.0
	Aug.	-	0.4	1.8	1.0	2.5	0.1	0.1	-	-	0.1
	Sept.	0.8	0.2	0.8	0.6	2.5	0.2	0.5	0.3	-	-
	Oct.	0.3	0.5	0.8	0.9	1.7	0.3	0.3	0.3	-	-
	Nov.	0.4	0.5	0.9	1.4	0.5	0.3	0.7	0.2	-	0.4
	Dec.	0.5	0.5	0.9	1.4	0.3	0.1	-	0.1	0.0	0.0

Table A.4 Bleu marlin Catch per 100 hooks by month and area

Year	Month	GG	GUI	NOE	CV	BEN	CAR	NOW	BAH	RIO	FLA
1956	June	-	0.3	-	-	-	-	-	-	-	-
	July	-	-	-	-	-	-	-	0.2	-	-
	Aug.	-	0.8	0.4	-	-	-	-	-	-	-
	Sept.	-	0.5	0.1	-	-	-	-	-	-	-
	Oct.	-	0.6	0.2	-	-	-	-	-	-	-
	Nov.	-	0.4	0.1	-	-	-	-	-	-	-
	Dec.	-	0.3	-	-	-	-	-	0.1	-	-
1957	Jan.	-	-	-	-	-	-	-	-	-	-
	Feb.	0.1	-	-	-	-	-	-	-	-	-
	Mar.	0.1	-	-	-	-	-	-	-	-	-
	Apr.	0.3	0.8	0.4	-	-	-	-	0.2	-	-
	May	0.3	0.2	0.3	-	-	-	-	0.3	-	-
	June	0.3	0.2	0.3	0.1	-	-	-	0.2	-	-
	July	0.3	0.3	0.1	0.1	-	-	-	-	-	-
	Aug.	0.2	0.3	0.2	0.1	-	-	-	-	-	-
	Sept.	0.2	0.2	0.4	0.2	-	0.0	-	-	-	-
	Oct.	0.4	0.3	0.4	0.3	-	-	1.2	-	-	-
	Nov.	0.2	0.3	0.3	0.1	-	-	-	-	-	-
	Dec.	0.2	0.2	0.2	-	-	-	-	-	-	-
1958	Jan.	0.1	0.3	0.3	-	-	-	-	-	-	-
	Feb.	0.1	-	-	-	-	-	-	0.6	-	-
	Mar.	0.0	-	-	-	-	-	-	1.7	-	-
	Apr.	0.2	-	-	-	-	-	-	1.3	-	-
	May	0.4	0.2	-	0.0	-	-	-	0.2	-	-
	June	-	0.1	0.0	0.0	-	0.0	-	0.6	-	-
	July	-	0.1	0.0	0.0	-	0.1	-	-	-	-
	Aug.	-	0.1	0.1	-	-	0.0	-	-	-	-
	Sept.	-	0.1	0.1	0.1	-	0.4	-	-	-	-
	Oct.	-	0.0	0.1	0.1	-	-	-	-	-	-
	Nov.	-	0.1	0.0	0.3	-	0.0	-	-	-	-
	Dec.	-	0.1	0.1	-	-	-	0.1	-	-	-
1959	Jan.	0.0	0.1	0.1	-	-	-	0.0	0.3	-	-
	Feb.	0.0	0.1	0.0	-	-	-	-	0.5	1.0	-
	Mar.	0.0	0.0	-	-	0.0	-	-	0.6	-	-
	Apr.	0.1	0.2	0.8	-	-	0.2	-	0.7	-	-
	May	0.1	0.2	0.1	0.0	-	0.0	-	0.2	-	-
	June	0.0	0.1	0.1	0.1	-	0.1	0.0	0.0	-	-
	July	-	0.0	0.0	0.0	-	0.0	-	-	-	-
	Aug.	-	0.0	0.1	0.0	-	0.0	-	-	-	-
	Sept.	0.3	0.1	0.2	0.0	-	-	0.3	0.2	-	-
	Oct.	0.0	0.2	0.2	0.1	-	-	-	0.1	-	-
	Nov.	0.2	0.1	0.2	0.1	0.0	0.4	0.2	0.4	-	-
	Dec.	0.0	0.0	0.0	0.1	0.0	0.2	0.0	0.5	1.3	-

Table A.4 (Cont.)

Year	Month	GG	GUI	NOE	CV	BEN	CAR	NOW	BAH	RIO	FLA
1960	Jan.	0.0	0.0	0.0	-	0.0	0.0	0.0	0.6	-	-
	Feb.	0.0	0.0	-	-	0.0	-	-	-	-	-
	Mar.	0.0	-	-	-	0.0	-	-	0.5	-	-
	Apr.	0.1	0.0	0.0	0.0	-	-	-	0.3	-	-
	May	0.1	0.0	0.0	0.1	0.0	-	-	0.1	-	-
	June	0.1	0.1	0.1	0.0	-	0.0	-	0.1	0.0	-
	July	-	0.0	0.1	0.0	-	0.0	-	0.1	-	-
	Aug.	-	0.0	0.1	0.0	-	0.3	0.0	0.0	0.0	-
	Sept.	-	0.1	0.1	0.1	-	0.0	0.1	0.1	-	-
	Oct.	-	0.2	0.2	-	0.2	0.3	0.1	0.2	-	-
	Nov.	0.0	0.1	0.1	0.1	0.2	0.3	0.0	0.2	-	-
	Dec.	0.0	-	-	0.0	0.0	0.0	-	0.5	-	-
1961	Jan.	0.0	-	-	-	0.0	0.2	-	0.6	-	-
	Feb.	0.0	0.0	-	-	0.0	-	-	1.2	-	-
	Mar.	0.1	0.0	0.1	-	0.0	-	-	1.5	-	-
	Apr.	0.1	-	0.3	0.2	0.1	-	-	1.2	0.9	-
	May	0.1	0.1	0.1	0.1	0.3	-	-	0.3	0.3	-
	June	0.2	0.0	0.1	0.0	0.3	0.0	-	0.2	0.2	-
	July	0.1	0.1	0.0	0.0	0.2	0.0	0.3	0.1	0.1	-
	Aug.	-	0.1	0.1	0.0	0.0	-	0.2	0.0	0.1	-
	Sept.	0.0	0.0	0.1	0.1	0.0	-	-	-	-	-
	Oct.	0.2	0.2	0.2	0.3	0.1	-	0.3	0.1	0.0	-
	Nov.	0.1	0.2	0.2	0.2	0.1	-	-	0.3	0.0	-
	Dec.	0.1	0.2	0.1	0.0	0.1	-	-	0.2	0.2	-
1962	Jan.	0.1	-	0.3	1.6	0.1	-	-	0.3	-	-
	Feb.	0.1	-	-	-	0.0	-	-	0.8	0.8	-
	Mar.	0.1	0.0	-	-	0.1	-	-	1.1	1.2	-
	Apr.	0.1	0.2	0.1	0.1	0.1	-	-	0.3	0.2	-
	May	0.1	0.1	0.2	0.0	-	0.1	-	0.2	0.3	0.0
	June	0.1	0.1	0.1	0.0	0.1	0.3	0.1	0.1	0.2	0.0
	July	0.1	0.1	0.1	0.0	0.3	0.6	0.2	0.1	-	0.0
	Aug.	-	0.1	0.1	0.0	0.1	0.2	0.2	-	-	0.0
	Sept.	-	0.3	0.1	0.0	0.0	-	0.1	0.1	-	0.1
	Oct.	0.1	0.1	0.1	0.1	0.0	-	0.3	0.1	-	0.1
	Nov.	0.1	0.1	0.1	0.1	0.1	-	0.2	0.2	0.4	-
	Dec.	0.1	-	0.1	-	0.1	-	-	0.2	0.3	-
1963	Jan.	0.1	-	0.1	1.1	0.1	-	-	0.3	0.4	-
	Feb.	0.1	0.1	-	0.6	0.0	0.2	-	0.5	0.8	-
	Mar.	0.1	0.1	0.1	0.0	0.0	0.0	-	0.2	0.4	-
	Apr.	0.1	0.1	0.1	0.1	-	-	0.0	0.1	-	-
	May	0.1	0.1	0.1	0.0	0.0	0.7	0.2	0.1	0.0	0.4
	June	0.0	0.2	0.1	0.1	0.2	0.3	0.2	-	-	0.5
	July	-	0.0	0.0	0.0	0.1	0.1	0.2	0.0	-	0.4
	Aug.	-	0.1	0.1	0.0	0.1	0.1	0.1	-	-	0.3
	Sept.	0.1	0.1	0.1	0.0	0.0	0.3	0.0	0.1	-	-
	Oct.	0.1	0.1	0.1	0.1	0.0	0.2	0.0	0.2	-	-
	Nov.	0.2	0.1	0.1	0.1	0.1	0.3	0.0	0.1	-	0.2
	Dec.	0.1	0.1	0.0	0.1	0.1	0.0	-	0.2	0.3	0.1

Table A.5 White marlin Catch per 100 hooks by month and area

Year	Month	GG	GUI	NOE	CV	BEN	CAR	NOW	BAH	RIO	FLA
1956	June	0.0	-	-	-	-	-	-	-	-	-
	July	-	-	-	-	-	-	-	0.0	-	-
	Aug.	-	0.0	0.0	-	-	-	-	-	-	-
	Sept.	-	0.0	0.0	-	-	-	-	-	-	-
	Oct.	-	0.0	0.0	-	-	-	-	-	-	-
	Nov.	-	0.1	0.0	-	-	-	-	-	-	-
	Dec.	-	0.0	-	-	-	-	-	0.0	-	-
1957	Jan.	-	-	-	-	-	-	-	-	-	-
	Feb.	0.0	-	-	-	-	-	-	-	-	-
	Mar.	0.0	-	-	-	-	-	-	-	-	-
	Apr.	0.0	0.1	0.0	-	-	-	-	0.0	-	-
	May	0.0	0.0	0.0	-	-	-	-	0.0	-	-
	June	0.0	0.0	0.0	0.0	-	-	-	0.0	-	-
	July	0.0	0.0	0.0	0.0	-	-	-	-	-	-
	Aug.	0.0	0.0	0.0	0.0	-	-	-	-	-	-
	Sept.	0.0	0.0	0.0	0.0	-	0.0	-	-	-	-
	Oct.	0.0	0.1	0.0	0.0	-	-	0.0	-	-	-
	Nov.	0.0	0.1	0.0	0.0	-	-	-	-	-	-
	Dec.	0.0	0.0	0.0	-	-	-	-	-	-	-
1958	Jan.	0.0	0.1	0.4	-	-	-	-	-	-	-
	Feb.	0.0	-	-	-	-	-	-	0.0	-	-
	Mar.	0.0	-	-	-	-	-	-	0.0	-	-
	Apr.	0.0	-	-	-	-	-	-	0.0	-	-
	May	0.0	0.0	-	0.0	-	-	-	0.0	-	-
	June	-	0.0	0.0	0.0	-	0.0	0.0	-	-	-
	July	-	0.0	0.0	0.0	-	0.0	-	-	-	-
	Aug.	-	0.0	0.3	-	-	0.0	-	-	-	-
	Sept.	-	0.0	0.0	0.0	-	0.0	-	-	-	-
	Oct.	-	0.0	0.0	0.0	-	-	-	-	-	-
	Nov.	-	0.0	0.0	0.0	-	0.0	-	-	-	-
	Dec.	-	0.0	0.1	-	-	-	0.0	-	-	-
1959	Jan.	0.0	0.0	0.0	-	-	-	0.0	0.0	-	-
	Feb.	0.0	0.0	0.0	-	-	-	-	0.1	0.0	-
	Mar.	0.0	0.0	-	-	0.0	-	-	0.1	-	-
	Apr.	0.0	0.1	0.0	-	-	0.2	-	0.0	-	-
	May	0.0	0.0	0.0	0.0	-	0.0	-	0.0	-	-
	June	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	-	-
	July	-	0.0	0.0	0.0	-	0.0	-	-	-	-
	Aug.	-	0.0	0.0	0.0	-	0.0	-	-	-	-
	Sept.	0.2	0.0	0.0	0.0	-	-	0.0	0.0	-	-
	Oct.	0.0	0.0	0.1	0.1	-	-	-	0.5	-	-
	Nov.	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.1	-	-
	Dec.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	1.4	-

Table A.5 (Cont.)

Year	Month	GG	GUI	NOE	CV	BEN	CAR	NOW	BAH	RIO	FLA
1960	Jan.	0.0	0.0	0.0	-	0.0	0.0	0.0	0.2	-	-
	Feb.	0.0	0.4	-	-	0.0	-	-	0.0	-	-
	Mar	0.0	-	-	-	0.0	-	-	0.0	-	-
	Apr.	0.0	0.4	0.0	0.0	-	-	-	0.0	-	-
	May	0.0	0.0	0.0	0.0	0.0	-	-	0.0	-	-
	June	0.0	0.0	0.0	0.0	-	0.0	-	0.2	0.0	-
	July	-	0.0	0.0	0.0	-	0.0	-	0.0	-	-
	Aug.	-	0.0	0.0	0.0	-	0.2	0.0	0.0	0.0	-
	Sept.	-	0.0	0.0	0.0	-	0.0	0.0	1.4	-	-
	Oct.	-	0.0	0.0	-	0.3	0.0	0.1	0.1	-	-
	Nov.	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.2	-	-
	Dec.	0.0	-	-	0.9	0.0	0.0	-	0.2	-	-
1961	Jan.	0.0	-	-	-	0.0	0.0	-	0.2	-	-
	Feb.	0.0	0.0	-	-	0.0	-	-	0.2	-	-
	Mar.	0.0	0.0	0.0	-	0.0	-	-	0.1	-	-
	Apr.	0.0	-	0.0	0.0	0.0	-	-	0.3	0.0	-
	May	0.0	0.0	0.0	0.0	0.0	-	-	0.4	0.0	-
	June	0.0	0.0	0.0	0.0	0.0	0.0	-	0.7	0.0	-
	July	0.0	0.1	0.0	0.0	0.7	0.2	0.1	0.3	0.0	-
	Aug.	-	0.0	0.1	0.0	0.0	-	0.0	0.0	0.0	-
	Sept.	0.0	0.0	0.1	0.0	0.2	-	-	-	-	-
	Oct.	0.3	0.0	0.2	0.5	0.2	-	0.0	0.5	0.0	-
	Nov.	0.0	0.1	0.2	0.4	0.2	-	-	0.8	0.0	-
	Dec.	0.0	0.0	0.1	0.0	0.2	-	-	0.4	0.0	-
1962	Jan.	0.0	-	0.5	0.3	0.8	-	-	0.2	-	-
	Feb.	0.0	-	-	-	1.1	-	-	0.3	0.0	-
	Mar.	0.0	0.0	-	-	0.0	-	-	0.1	0.0	-
	Apr.	0.0	0.1	0.7	0.0	0.0	-	-	0.1	0.2	-
	May	0.1	0.1	0.2	0.0	-	0.1	-	0.3	0.0	0.0
	June	0.0	0.0	0.1	0.0	2.1	0.3	0.0	0.7	0.0	0.3
	July	0.0	0.1	0.0	0.0	0.7	0.4	0.0	0.3	-	0.1
	Aug.	-	0.1	0.1	0.1	0.5	0.1	0.0	-	-	0.0
	Sept.	-	0.1	0.1	0.3	0.1	-	0.1	0.0	-	0.1
	Oct.	0.4	0.2	0.1	0.5	0.2	-	0.9	0.8	-	0.8
	Nov.	0.1	0.1	0.1	0.0	0.3	-	0.2	0.7	0.5	-
	Dec.	0.0	-	0.2	-	0.3	-	-	0.4	0.2	-
1963	Jan.	0.0	-	0.0	0.1	0.2	-	-	0.3	0.2	-
	Feb.	0.0	0.2	-	0.1	0.0	1.9	-	0.3	0.1	-
	Mar.	0.0	0.3	0.0	0.0	0.0	0.3	-	0.1	0.0	-
	Apr.	0.0	0.1	0.2	0.1	-	-	0.0	0.2	-	-
	May	0.0	0.1	0.2	0.0	0.0	1.5	0.2	0.1	0.1	0.6
	June	0.4	0.0	0.1	0.0	0.0	0.3	0.1	-	-	0.2
	July	-	0.1	0.0	0.0	0.4	0.1	0.0	1.6	-	0.1
	Aug.	-	0.0	0.0	0.1	0.5	0.1	0.0	-	-	0.1
	Sept.	0.1	0.1	0.1	0.1	0.1	0.2	0.0	0.8	-	-
	Oct.	0.1	0.0	1.0	0.0	0.1	0.0	0.0	1.7	-	-
	Nov.	0.0	0.1	0.2	0.0	0.3	0.2	0.0	0.4	-	0.1
	Dec.	0.0	0.1	0.0	0.0	0.2	0.1	-	0.8	0.3	0.2

Table A.6 Other marlins Catch per 100 hooks by month and area

Year	Month	GG	GUI	NOE	CV	BEN	CAR	NOW	BAH	RIO	FLA
1956	June	-	0.1	-	-	-	-	-	-	-	-
	July	-	-	-	-	-	-	-	0.1	-	-
	Aug.	-	0.0	0.0	-	-	-	-	-	-	-
	Sept.	-	0.0	0.0	-	-	-	-	-	-	-
	Oct.	-	0.0	0.0	-	-	-	-	-	-	-
	Nov.	-	0.0	0.0	-	-	-	-	-	-	-
	Dec.	-	0.0	-	-	-	-	-	0.0	-	-
1957	Jan.	-	-	-	-	-	-	-	-	-	-
	Feb.	0.0	-	-	-	-	-	-	-	-	-
	Mar.	0.0	-	-	-	-	-	-	-	-	-
	Apr.	0.0	0.0	0.0	-	-	-	-	0.0	-	-
	May	0.0	0.1	0.1	-	-	-	-	0.0	-	-
	June	0.0	0.0	0.1	0.0	-	-	-	0.0	-	-
	July	0.0	0.5	0.0	0.0	-	-	-	-	-	-
	Aug.	0.0	0.2	0.6	0.0	-	-	-	-	-	-
	Sept.	0.0	0.0	0.3	0.1	-	0.0	-	-	-	-
	Oct.	0.0	0.3	0.2	0.0	-	-	0.1	-	-	-
	Nov.	0.0	0.1	0.1	0.0	-	-	-	-	-	-
	Dec.	0.0	0.0	0.1	-	-	-	-	-	-	-
1958	Jan.	0.0	0.3	0.2	-	-	-	-	-	-	-
	Feb.	0.1	-	-	-	-	-	-	0.0	-	-
	Mar.	0.1	-	-	-	-	-	-	0.0	-	-
	Apr.	0.1	-	-	-	-	-	-	0.0	-	-
	May	0.0	0.3	-	0.0	-	-	-	0.0	-	-
	June	-	0.2	0.0	0.0	-	0.0	-	0.1	-	-
	July	-	0.2	0.0	0.0	-	0.0	-	-	-	-
	Aug.	-	0.1	0.0	-	-	0.0	-	-	-	-
	Sept.	-	0.2	0.0	0.0	-	0.0	-	-	-	-
	Oct.	-	0.0	0.0	0.0	-	-	-	-	-	-
	Nov.	-	0.0	0.0	0.1	-	0.0	-	-	-	-
	Dec.	-	0.0	0.0	-	-	-	0.0	-	-	-
1959	Jan.	0.0	0.0	0.0	-	-	-	0.0	0.0	-	-
	Feb.	0.0	0.0	0.0	-	-	-	-	0.0	0.0	-
	Mar.	0.0	0.0	-	-	0.0	-	-	0.0	-	-
	Apr.	0.0	0.0	0.0	-	-	0.6	-	0.0	-	-
	May	0.0	0.0	0.0	0.0	-	0.0	-	0.1	-	-
	June	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	-	-
	July	-	0.0	0.0	0.0	-	0.0	-	-	-	-
	Aug.	-	0.0	0.0	0.0	-	0.0	-	-	-	-
	Sept.	0.2	0.0	0.0	0.0	-	-	0.0	0.6	-	-
	Oct.	0.0	0.1	0.0	0.0	-	-	-	0.0	-	-
	Nov.	0.1	0.0	0.0	0.0	0.0	0.3	0.0	0.4	-	-
	Dec.	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	-

Table A.6 (Cont.)

Year	Month	GG	GUI	NOE	CV	BEN	CAR	NOW	BAH	RIO	FLA
1960	Jan.	0.0	0.0	0.0	-	0.0	0.0	0.0	0.2	-	-
	Feb.	0.0	0.0	-	-	0.0	-	-	0.0	-	-
	Mar.	0.0	-	-	-	0.0	-	-	0.0	-	-
	Apr.	0.1	0.0	0.0	0.0	-	-	-	0.3	-	-
	May	0.1	0.0	0.0	0.1	0.0	-	-	0.1	-	-
	June	0.0	0.3	0.1	0.0	-	0.0	-	0.1	0.0	-
	July	-	0.0	0.0	0.0	-	0.0	-	0.0	-	-
	Aug.	-	0.1	0.0	0.0	-	0.7	0.0	0.0	0.0	-
	Sept.	-	0.2	0.0	0.0	-	0.0	0.0	0.2	-	-
	Oct.	-	0.1	0.1	-	0.1	0.0	0.0	0.1	-	-
	Nov.	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	-	-
	Dec.	0.0	-	-	0.0	0.0	0.0	-	0.1	-	-
1961	Jan.	0.1	-	-	-	0.0	0.0	-	0.1	-	-
	Feb.	0.1	0.0	-	-	0.1	-	-	0.3	-	-
	Mar.	0.0	0.0	0.0	-	0.0	-	-	0.2	-	-
	Apr.	0.1	-	0.0	1.5	0.0	-	-	0.3	0.0	-
	May	0.3	0.0	0.1	0.1	0.1	-	-	0.1	0.0	-
	June	0.2	0.1	0.0	0.0	0.1	0.1	-	0.1	0.0	-
	July	0.0	0.0	0.0	0.0	0.2	0.3	0.1	0.2	0.0	-
	Aug.	-	0.2	0.0	0.0	0.0	-	0.1	0.0	0.0	-
	Sept.	0.0	0.0	0.0	0.1	0.1	-	-	-	-	-
	Oct.	0.1	0.3	0.2	0.2	0.1	-	0.2	0.1	0.0	-
	Nov.	0.2	0.2	0.1	0.1	0.1	-	-	0.2	0.0	-
	Dec.	0.2	0.0	0.0	0.0	0.1	-	-	0.1	0.0	-
1962	Jan.	0.2	-	0.3	2.0	0.1	-	-	0.3	-	-
	Feb.	0.2	-	-	-	0.1	-	-	0.5	0.0	-
	Mar.	0.1	0.0	-	-	0.1	-	-	0.1	0.0	-
	Apr.	0.3	0.2	0.2	0.5	0.1	-	-	0.1	0.0	-
	May	0.0	0.3	0.0	0.0	-	0.0	-	0.2	0.0	0.0
	June	0.2	0.4	0.2	0.2	0.1	0.0	0.1	0.2	0.0	0.0
	July	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.1	-	0.0
	Aug.	-	0.0	0.0	0.0	0.0	0.1	0.1	-	-	0.0
	Sept.	-	0.1	0.0	0.0	0.0	-	0.1	0.0	-	0.1
	Oct.	0.1	0.2	0.0	0.0	0.0	-	0.0	0.2	-	0.1
	Nov.	0.2	0.1	0.0	0.0	0.1	-	0.0	0.1	0.0	-
	Dec.	0.1	-	0.1	-	0.1	-	-	0.2	0.1	-
1963	Jan.	0.0	-	0.0	0.1	0.2	-	-	0.2	0.1	-
	Feb.	0.1	0.0	-	0.1	0.0	0.3	-	0.2	0.1	-
	Mar.	0.1	0.0	0.0	0.0	0.1	0.1	-	0.1	0.7	-
	Apr.	0.3	0.2	0.0	0.1	-	-	0.0	0.2	-	-
	May	0.6	0.1	0.1	0.0	0.4	0.2	0.0	0.1	0.0	0.0
	June	0.2	0.2	0.0	0.1	0.2	0.1	0.0	-	-	0.0
	July	-	0.1	0.2	0.0	0.1	0.0	0.0	0.0	-	0.0
	Aug.	-	0.1	0.0	0.0	0.0	0.0	0.0	-	-	0.0
	Sept.	0.2	0.1	0.0	0.0	0.0	0.1	0.0	0.2	-	-
	Oct.	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.6	-	-
	Nov.	0.1	0.1	0.1	0.0	0.2	0.0	0.0	0.4	-	0.0
	Dec.	0.1	0.0	0.0	0.2	0.2	0.0	-	0.3	0.2	0.0

Table A.7 - Bluefin tuna Catch per 100 hooks by month and area

Year	Month	GG	GUI	NOE	CV	BEN	CAR	NOW	BAH	RIO	FLA
1956	June	-	0.0	-	-	-	-	-	-	-	-
	July	-	-	-	-	-	-	-	0.0	-	-
	Aug.	-	0.0	0.1	-	-	-	-	-	-	-
	Sept.	-	0.0	0.0	-	-	-	-	-	-	-
	Oct.	-	0.0	0.0	-	-	-	-	-	-	-
	Nov.	-	0.0	0.0	-	-	-	-	-	-	-
	Dec.	-	0.0	-	-	-	-	-	0.0	-	-
1957	Jan.	-	-	-	-	-	-	-	-	-	-
	Feb.	0.0	-	-	-	-	-	-	-	-	-
	Mar.	0.0	-	-	-	-	-	-	-	-	-
	Apr.	0.0	0.2	0.0	-	-	-	-	0.0	-	-
	May	0.0	0.0	0.0	-	-	-	-	0.0	-	-
	June	0.0	0.0	0.0	0.0	-	-	-	0.0	-	-
	July	0.0	0.0	0.0	0.0	-	-	-	-	-	-
	Aug.	0.0	0.0	0.0	0.0	-	-	-	-	-	-
	Sept.	0.0	0.0	0.0	0.0	-	0.0	-	-	-	-
	Oct.	0.0	0.0	0.0	0.0	-	-	0.0	-	-	-
	Nov.	0.0	0.0	0.0	0.0	-	-	-	-	-	-
	Dec.	0.0	0.0	0.0	-	-	-	-	-	-	-
1958	Jan.	0.0	0.0	0.0	-	-	-	-	-	-	-
	Feb.	0.0	-	-	-	-	-	-	0.1	-	-
	Mar.	0.0	-	-	-	-	-	-	0.3	-	-
	Apr.	0.0	-	-	-	-	-	-	0.2	-	-
	May	0.0	0.0	-	0.0	-	-	-	0.0	-	-
	June	-	0.0	0.0	0.0	-	0.0	-	0.0	-	-
	July	-	0.0	0.0	0.0	-	0.0	-	-	-	-
	Aug.	-	0.0	0.0	-	-	0.0	-	-	-	-
	Sept.	-	0.0	0.0	0.0	-	0.0	-	-	-	-
	Oct.	-	0.0	0.0	0.0	-	-	-	-	-	-
	Nov.	-	0.0	0.0	0.0	-	0.0	-	-	-	-
	Dec.	-	0.0	0.0	-	-	-	0.0	-	-	-
1959	Jan.	0.0	0.0	0.0	-	-	-	0.0	0.0	-	-
	Feb.	0.0	0.0	0.0	-	-	-	-	0.0	0.0	-
	Mar.	0.0	0.0	-	-	0.0	-	-	1.4	-	-
	Apr.	0.0	0.1	0.0	-	-	0.0	-	0.4	-	-
	May	0.0	0.0	0.0	0.0	-	0.0	-	0.0	-	-
	June	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	-	-
	July	-	0.0	0.0	0.0	-	0.0	-	-	-	-
	Aug.	-	0.0	0.0	0.0	-	0.0	-	-	-	-
	Sept.	0.0	0.0	0.0	0.0	-	-	0.0	0.0	-	-
	Oct.	0.0	0.0	0.1	0.0	-	-	-	0.0	-	-
	Nov.	0.0	0.0	0.1	0.0	0.5	0.0	0.0	0.0	-	-
	Dec.	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	-

Table A.7 (Cont.)

Year	Month	GG	GUI	NOE	CV	BEN	CAR	NOW	BAH	RIO	FLA
1960	Jan.	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	-
	Feb.	0.0	0.0	-	-	0.0	-	-	0.0	-	-
	Mar.	0.0	-	-	-	0.0	-	-	0.0	-	-
	Apr.	0.1	0.0	0.0	0.0	-	-	-	0.8	-	-
	May	0.0	0.0	0.3	0.0	0.0	-	-	0.1	-	-
	June	0.0	0.0	0.0	0.0	-	0.0	-	0.0	0.0	-
	July	-	0.0	0.0	0.0	-	0.0	-	0.0	-	-
	Aug.	-	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-
	Sept.	-	0.0	0.1	0.0	-	0.0	0.0	0.0	-	-
	Oct.	-	0.0	0.5	-	0.0	0.0	0.0	0.0	-	-
	Nov.	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	-	-
	Dec.	0.0	-	-	0.0	0.0	0.0	-	0.0	-	-
1961	Jan.	0.0	-	-	-	0.0	0.0	-	0.0	-	-
	Feb.	0.0	0.0	-	-	0.0	-	-	0.0	-	-
	Mar.	0.0	0.0	0.0	-	0.0	-	-	0.4	-	-
	Apr.	0.0	-	0.0	0.0	0.0	-	-	0.1	0.0	-
	May	0.0	0.0	0.0	0.0	0.0	-	-	0.3	0.0	-
	June	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	-
	July	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-
	Aug.	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.5	-
	Sept.	0.0	0.0	0.1	0.0	0.0	-	-	-	-	-
	Oct.	0.0	0.0	1.1	0.0	0.0	-	0.0	0.4	0.0	-
	Nov.	0.0	0.1	0.0	0.0	0.0	-	-	0.0	0.0	-
	Dec.	0.0	0.0	0.0	0.0	0.0	-	-	0.0	0.0	-
1962	Jan.	0.0	-	0.0	0.0	0.0	-	-	0.0	-	-
	Feb.	0.0	-	-	-	0.1	-	-	0.2	0.0	-
	Mar.	0.0	0.0	-	-	0.0	-	-	0.2	0.0	-
	Apr.	0.0	0.4	0.1	0.1	0.0	-	-	0.6	0.0	-
	May	0.1	0.0	0.1	0.0	-	0.0	-	0.2	0.0	0.0
	June	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	July	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0
	Aug.	-	0.0	0.0	0.0	0.0	0.0	0.0	-	-	0.0
	Sept.	-	0.0	0.7	0.0	0.0	-	0.0	0.0	-	0.0
	Oct.	0.0	0.0	1.0	0.1	0.0	-	0.0	0.4	-	0.0
	Nov.	0.0	0.4	0.4	0.0	0.0	-	0.0	0.1	0.0	-
	Dec.	0.0	-	0.0	-	0.0	-	-	0.0	0.0	-
1963	Jan.	0.0	-	0.0	0.0	0.0	-	-	0.0	0.0	-
	Feb.	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0	-
	Mar.	0.0	0.6	0.0	0.0	0.0	0.0	-	0.6	0.2	-
	Apr.	0.0	1.0	0.2	0.0	-	-	0.0	1.2	-	-
	May	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1
	June	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-	0.0
	July	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0
	Aug.	-	0.0	0.0	0.0	0.0	0.0	0.0	-	-	0.0
	Sept.	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	-	-
	Oct.	0.0	0.0	0.6	0.1	0.0	0.0	0.0	0.4	-	-
	Nov.	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.2	-	0.0
	Dec.	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0

Table A.B - Swordfish Catch per 100 hooks by month and area

Year	Month	GG	GUI	NOE	CV	BEN	CAR	NOW	BAH	RIO	FLA
1956	June	-	0.0	-	-	-	-	-	-	-	-
	July	-	-	-	-	-	-	-	0.0	-	-
	Aug.	-	0.0	0.0	-	-	-	-	-	-	-
	Sept.	-	0.0	0.0	-	-	-	-	-	-	-
	Oct.	-	0.0	0.0	-	-	-	-	-	-	-
	Nov.	-	0.0	0.0	-	-	-	-	-	-	-
	Dec.	-	0.0	-	-	-	-	-	0.0	-	-
1957	Jan.	-	-	-	-	-	-	-	-	-	-
	Feb.	0.0	-	-	-	-	-	-	-	-	-
	Mar.	0.0	-	-	-	-	-	-	-	-	-
	Apr.	0.0	0.0	0.1	-	-	-	-	0.0	-	-
	May.	0.0	0.0	0.1	-	-	-	-	0.0	-	-
	June	0.0	0.0	0.1	0.0	-	-	-	0.0	-	-
	July	0.0	0.0	0.1	0.0	-	-	-	-	-	-
	Aug.	0.1	0.0	0.0	0.0	-	-	-	-	-	-
	Sept.	0.0	0.0	0.0	0.0	-	0.0	-	-	-	-
	Oct.	0.1	0.0	0.0	0.0	-	-	0.0	-	-	-
	Nov.	0.0	0.0	0.0	0.1	-	-	-	-	-	-
	Dec.	0.0	0.0	0.0	-	-	-	-	-	-	-
1958	Jan.	0.0	0.0	0.0	-	-	-	-	-	-	-
	Feb.	0.0	-	-	-	-	-	-	0.0	-	-
	Mar.	0.0	-	-	-	-	-	-	0.0	-	-
	Apr.	0.0	-	-	-	-	-	-	0.0	-	-
	May	0.0	0.0	-	0.0	-	-	-	0.1	-	-
	June	-	0.0	0.0	0.0	-	0.0	-	0.0	-	-
	July	-	0.0	0.0	0.0	-	0.0	-	-	-	-
	Aug.	-	0.0	0.0	-	-	0.0	-	-	-	-
	Sept.	-	0.0	0.0	0.0	-	0.0	-	-	-	-
	Oct.	-	0.0	0.0	0.0	-	-	-	-	-	-
	Nov.	-	0.0	0.0	0.0	-	0.0	-	-	-	-
	Dec.	-	0.0	0.0	-	-	-	0.0	-	-	-
1959	Jan.	0.0	0.0	0.0	-	-	-	0.0	0.0	-	-
	Feb.	0.0	0.0	0.0	-	-	-	-	0.0	0.0	-
	Mar.	0.0	0.0	-	-	0.1	-	-	0.0	-	-
	Apr.	0.0	0.0	0.0	-	-	0.0	-	0.0	-	-
	May	0.0	0.0	0.0	0.1	-	0.0	-	0.0	-	-
	June	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	-	-
	July	-	0.0	0.0	0.0	-	0.0	-	-	-	-
	Aug.	-	0.0	0.0	0.0	-	0.0	-	-	-	-
	Sept.	0.0	0.0	0.0	0.0	-	-	0.0	0.0	-	-
	Oct.	0.0	0.0	0.0	0.0	-	-	-	0.0	-	-
	Nov.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-
	Dec.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-

Table A.8 (Cont.)

Year	Month	GG	GUI	NOE	CV	BEN	CAR	NOW	BAH	RIO	FLA
1960	Jan.	0.1	0.0	0.0	-	0.0	0.0	0.1	0.0	-	-
	Feb.	0.0	0.0	-	-	0.0	-	-	0.0	-	-
	Mar.	0.0	-	-	-	0.0	-	-	0.0	-	-
	Apr.	0.0	0.0	0.0	0.0	-	-	-	0.0	-	-
	May	0.0	0.0	0.0	0.0	0.0	-	-	0.0	-	-
	June	0.0	0.0	0.0	0.0	-	0.0	-	0.0	0.0	-
	July	-	0.0	0.0	0.0	-	0.0	-	0.0	-	-
	Aug.	-	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-
	Sept.	-	0.0	0.0	0.0	-	0.0	0.0	0.0	-	-
	Oct.	-	0.0	0.0	-	0.0	0.0	0.0	0.0	-	-
	Nov.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-
	Dec.	0.0	-	-	0.0	0.0	0.0	-	0.0	-	-
1961	Jan.	0.1	-	-	-	0.0	0.0	-	0.0	-	-
	Feb.	0.0	0.0	-	-	0.0	-	-	0.0	-	-
	Mar.	0.0	0.0	0.0	-	0.0	-	-	0.0	-	-
	Apr.	0.0	-	0.0	0.0	0.0	-	-	0.0	0.1	-
	May	0.1	0.0	0.1	0.0	0.0	-	-	0.0	0.0	-
	June	0.1	0.0	0.0	0.0	0.1	0.0	-	0.0	0.1	-
	July	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	-
	Aug.	-	0.0	0.1	0.1	0.0	-	0.0	0.0	0.8	-
	Sept.	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
	Oct.	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.2	-
	Nov.	0.1	0.0	0.0	0.0	0.0	-	-	0.0	0.1	-
	Dec.	0.1	0.0	0.0	0.0	0.0	-	-	0.0	0.1	-
1962	Jan.	0.1	-	0.0	0.0	0.0	-	-	0.0	-	-
	Feb.	0.1	-	-	-	0.0	-	-	0.0	0.0	-
	Mar.	0.1	0.0	-	-	0.0	-	-	0.1	0.1	-
	Apr.	0.1	0.1	0.1	0.0	0.1	-	-	0.0	0.0	-
	May	0.0	0.0	0.1	0.0	-	0.0	-	0.1	0.1	0.0
	June	0.1	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	July	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.2	-	0.0
	Aug.	-	0.0	0.0	0.0	0.1	0.0	0.0	-	-	0.0
	Sept.	-	0.0	0.0	0.0	0.0	-	0.0	0.0	-	0.0
	Oct.	0.1	0.0	0.0	0.1	0.0	-	0.1	0.0	-	0.0
	Nov.	0.0	0.0	0.0	0.1	0.0	-	0.1	0.0	0.0	-
	Dec.	0.1	-	0.1	-	0.0	-	-	0.0	0.0	-
1963	Jan.	0.1	-	0.1	0.0	0.0	-	-	0.0	0.1	-
	Feb.	0.1	0.0	-	0.1	0.0	0.0	-	0.1	0.1	-
	Mar.	0.1	0.0	0.1	0.0	0.0	0.0	-	0.0	0.3	-
	Apr.	0.1	0.1	0.1	0.0	-	-	0.0	0.1	-	-
	May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
	June	0.0	0.0	0.0	0.1	0.1	0.0	0.0	-	-	0.0
	July	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0
	Aug.	-	0.0	0.0	0.0	0.1	0.1	0.0	-	-	0.0
	Sept.	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	-	-
	Oct.	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	-	-
	Nov.	0.1	0.0	0.1	0.1	0.1	0.1	0.0	0.0	-	0.0
	Dec.	0.1	0.0	0.1	0.1	0.0	0.1	-	0.0	0.1	0.0

Table A.9 - Finishing Effort (thousands of hooks, adjusted for sampling)

Year	Month	GG	GUI	NOE	CV	BEN	CAR	NOW	BAH	RIO	FLA
1956	June	-	16	-	-	-	-	-	-	-	-
	July	-	-	-	-	-	-	-	18	-	-
	Aug.	-	17	12	-	-	-	-	-	-	-
	Sept.	-	13	4	-	-	-	-	-	-	-
	Oct.	-	8	12	-	-	-	-	-	-	-
	Nov.	-	3	3	-	-	-	-	-	-	-
	Dec.	-	25	-	-	-	-	-	1	-	-
1957	Jan.	-	-	-	-	-	-	-	-	-	-
	Feb.	23	-	-	-	-	-	-	-	-	-
	Mar.	27	-	-	-	-	-	-	-	-	-
	Apr.	27	7	44	-	-	-	-	4	-	-
	May	159	9	97	-	-	-	-	49	-	-
	June	173	14	26	42	-	-	-	21	-	-
	July	279	32	37	22	-	-	-	-	-	-
	Aug.	71	13	88	82	-	-	-	-	-	-
	Sept.	148	35	262	46	-	5	-	-	-	-
	Oct.	93	32	343	37	-	-	1	-	-	-
	Nov.	147	246	113	5	-	-	-	-	-	-
	Dec.	180	127	208	-	-	-	-	-	-	-
1958	Jan.	534	33	90	-	-	-	-	-	-	-
	Feb.	316	-	-	-	-	-	-	115	-	-
	Mar.	538	-	-	-	-	-	-	48	-	-
	Apr.	266	-	-	-	-	-	-	86	-	-
	May	145	165	-	164	-	-	-	11	-	-
	June	-	134	216	423	-	99	-	107	-	-
	July	-	135	226	259	-	153	-	-	-	-
	Aug.	-	219	76	-	-	8	-	-	-	-
	Sept.	-	496	171	160	-	20	-	-	-	-
	Oct.	-	891	65	102	-	-	-	-	-	-
	Nov.	-	421	142	120	-	8	-	-	-	-
	Dec.	-	139	641	-	-	-	25	-	-	-
1959	Jan.	110	74	442	-	-	-	18	179	-	-
	Feb.	225	199	39	-	-	-	-	228	14	-
	Mar.	637	46	-	-	7	-	-	136	-	-
	Apr.	913	69	3	-	-	3	-	28	-	-
	May	850	86	207	37	-	54	-	32	-	-
	June	82	492	345	347	-	15	13	14	-	-
	July	-	269	575	593	-	3	-	-	-	-
	Aug.	-	66	72	1,119	-	8	-	-	-	-
	Sept.	16	113	146	748	-	-	39	2	-	-
	Oct.	52	392	1,044	227	-	-	-	13	-	-
	Nov.	74	655	462	189	4	38	8	503	-	-
	Dec.	26	361	27	33	4	136	13	1,257	3	-

Table A.9 (Cont.)

1960	Jan.	499	84	9	-	14	15	3	537	-	-
	Feb.	913	48	-	-	155	-	-	190	-	-
	Mar.	975	-	-	-	134	-	-	58	-	-
	Apr.	1,396	9	67	59	-	-	-	110	-	-
	May	541	24	95	562	2	-	-	272	-	-
	June	3	118	720	1,035	-	2	-	136	5	-
	July	-	275	116	1,796	-	2	-	26	-	-
	Aug.	-	434	403	954	-	5	67	4	2	-
	Sept.	-	471	974	30	-	8	64	11	-	-
	Oct.	-	923	379	-	105	55	3	103	-	-
	Nov.	281	79	151	3	339	227	5	1,300	-	-
	Dec.	396	-	-	5	279	18	-	1,796	-	-
1961	Jan.	681	-	-	-	661	50	-	732	-	-
	Feb.	1,137	3	-	-	662	-	-	351	-	-
	Mar.	1,349	3	41	-	312	-	-	326	-	-
	Apr.	1,493	-	57	4	303	-	-	206	40	-
	May	1,162	19	512	933	31	-	-	365	53	-
	June	424	29	416	1,309	190	27	-	391	40	-
	July	197	24	220	904	104	14	63	319	64	-
	Aug.	-	121	404	811	900	-	8	5	47	-
	Sept.	3	86	303	232	121	-	-	-	-	-
	Oct.	77	217	125	13	1,109	-	18	76	33	-
	Nov.	432	45	21	21	1,162	-	-	485	25	-
	Dec.	531	3	3	11	95	-	-	2,412	38	-
1962	Jan.	457	-	39	29	354	-	-	3,032	-	-
	Feb.	918	-	-	-	1,537	-	-	927	6	-
	Mar.	2,000	6	-	-	1,367	-	-	493	53	-
	Apr.	2,009	27	202	668	961	-	-	580	19	-
	May	76	753	736	2,983	-	46	-	147	58	19
	June	231	701	723	759	313	1,041	16	192	17	104
	July	16	276	939	481	917	219	458	28	-	1,714
	Aug.	-	200	1,815	598	858	57	1,028	-	-	956
	Sept.	-	893	2,006	245	578	-	243	15	-	239
	Oct.	28	327	2,016	56	1,185	-	7	496	-	22
	Nov.	66	48	523	15	1,212	-	28	2,673	26	-
	Dec.	165	-	8	-	372	-	-	4,518	935	-
1963	Jan.	369	-	109	59	1,226	-	-	2,096	2,065	-
	Feb.	1,657	3	-	47	1,586	58	-	1,116	546	-
	Mar.	3,063	144	801	4	879	8	-	940	3	-
	Apr.	883	947	1,335	2,001	-	-	32	2,173	-	-
	May	195	958	1,116	2,254	4	35	565	177	5	762
	June	2	138	173	345	31	260	1,125	-	-	3,033
	July	-	23	191	223	375	114	828	3	-	2,397
	Aug.	-	212	1,113	221	1,034	419	419	-	-	359
	Sept.	6	146	1,284	268	923	540	74	74	-	-
	Oct.	73	315	1,386	82	841	467	72	131	-	-
	Nov.	92	323	455	179	654	407	20	528	-	14
	Dec.	136	94	96	45	203	245	-	956	183	430