RESUMEN

El documento describe las técnicas empleadas para estimar la talla y estructura demográfica del rabil capturado en el Atlántico, y presenta los resultados de las pesquerías de palangre y superficie, al Este y Oeste del Océano. Los métodos y resultados son similares a los utilizados en un estudio anterior (Coan y Sakagawa, 1975) pero con datos puestos al día.

Las capturas de la pesquería de superficie en el Atlántico oriental se calculan en 2.0 a 8.2 millones anuales de ejemplares de rabil, cuya talla varia de 22 a 192 cms. El grupo de edad dominante es el de 1 año con tallas de 31 a 84 cms. La estructura demográfica y composición por talla del rabil capturado por la pesquería de superficie al Oeste del Atlántico, se estiman presuponiendo igualdad en las tallas de los peces capturados por dicha pesquería al Este y Oeste del Océano. Las conclusiones indican que la pesquería de superficie al Oeste del Atlántico captura entre 11.000 y 200.000 peces. La pesquería de palangre obtiene aproximadamente de 420.000 a 879.000 ejemplares de rabil por año. Las tallas se clasifican entre 43 y 192 cms, y las edades dominantes son 2, 3 y 4 años (90 a 160 cms). Los peces más jóvenes, 2 y 3 años, tienden a predominar en las capturas obtenidas en el Atlántico Oeste, mientras que los de edad 3 y 4 predominan en las del Atlántico Este.

Tables 7, 8 and figures reproduced in Data Record Vol. 9
Tableaux 7, 8 et figures reproduits dans le Vol. 9 du Recueil de Données
Cuadros 7, 8 y figuras reproducidos en Vol. 9 de laColección de Datos Estadísticos

This study is an update of the analysis by Coan and Sakagawa (1976). Availability of updated catch and length-frequency statistics as well as new catch and effort data have made recompilation of length-frequency distributions of the catches necessary. The purpose of this paper is to describe the data and procedures used to estimate catch in numbers of yellowfin tuna, and to present the age and length compositions of the yellowfin tuna catch estimated for each quarter of the year, by ocean region (eastern and western; Figure 1) and fishery (longline and surface).

ATLANTIC YELLOWFIN TUNA FISHERY

Fishing for yellowfin tuna in the Atlantic Ocean began in the mid-1950's by the French with pole-and-line gear (baitboats). Since that time the fishery has developed to include over 18 countries and produced a record catch of 119,000 MT (metric tons) in 1975 (Table 1).

The fishery no longer involves only baitboats, but includes purse seiners and longliners too. Purse seiners and baitboats comprise the surface fishery. Approximately 69% of the total yellowfin tuna catch from the Atlantic is produced by the surface fishery. Most of the catch of the surface fishery is landed by the FIS (French-Ivory Coast and Senegalese), Spanish, Japanese and United States fleets and is made in the eastern tropical Atlantic

Longliners from Japan, Korea and Taiwan are the principal participants in the longline fishery. Approximately 31% of the total yellowfin tuna catch of the Atlantic is made by this fishery. The boats operate in both the eastern and western Atlantic.

DATA AND PROCEDURES

Data from the Atlantic yellowfin tuna fishery are collected primarily by the 14 member countries of the International Commission for the Conservation of Atlantic Tunas (ICCAT). Each member country is responsible for collecting and submitting to ICCAT, catch and effort, catch and length-frequency data from its own fleet. These data are assembled by ICCAT and distributed periodically to the member countries for use in various analyses.

Because of the large volume of data currently available on the fishery, the Southwest Fisheries Center developed a computer data base of catch and length-frequency statistics to expedite the handling of the data in analyses (ICCAT, 1975b). The sources and types of data on yellowfin tuna that are contained in the base are as follows:

Catch statistics

Total catch of yellowfin tuna by country, gear and ocean region for 1966-1974 (Table 1) was obtained from the ICCAT statistical Bulletin (ICCAT, 1975a). Preliminary data for 1975 were obtained from ICCAT (pers. commun., Madrid, Spain). For some catches the region in which the catches were made could not be determined from information in the Bulletin. For these, it was assumed that the fishing areas reported in catch-effort statistics of the fleet or similar fleets, are representative and indicative of the regions where the catches were made.

For the longline fishery, catch and effort information for the Japanese fleet was used to partition the catches of virtually all the longline fleets into western and eastern regions (Table 2). Japanese longline catch and effort data (Fisheries Agency of Japan 1968-75) are reported in number of fish and number of hooks by month-5° area. Number of fish was converted to weight by using the average weight of fish caught in each region and each year. The data were then used to partition the total longline catches into quarters of the year and region (Table 3).

For the surface fishery, catch by region for each country was determined from information on the fleet's fishing activities (Table 2). Quarterly distributions of the catches for each year, gear and region was also determined from catch and effort information (Table 3).

Length-frequency statistics

Length-frequency distributions were from several sources (Table 4). The most complete series of data is available for catches of the Japanese, FIS and United States fleets. The length frequencies are reported in fork length for all fleets except the FIS fleet, in which they are reported in predorsal length. Predorsal lengths were converted to fork lengths using a modified version of a computer program LFLDI (Fonteneau and Lenarz, MS)[1]. The program uses the equation,

$$\log L_f = 0.25204 + 1.18869 \log L_d$$

where L_f = fork length in centimeters and L_d = predorsal length in centimeters. The equation is based on the logarithmic equation of Poinsard (1969).

Length-frequency samples from catches of some fleets, particularly those that fished in the western Atlantic are unavailable. Samples from comparable fleets were substituted where data were unavailable (Tables 5 and 6). Substitution was usually within region, although for the western Atlantic, samples from the eastern Atlantic were used primarily.

For eastern Atlantic catches, the best series of length-frequency data for the catch of the surface fishery are from the FIS baitboat and purse seine, the U.S.A. purse seine, and the Japanese purse seine fleets. Another series, which is not as complete, is for the Atlantic baitboat fleets of Ghana, Japan, Korea and Panama that operate out of Tema, Ghana. Length-frequency data for catches of this entire Ghana-based baitboat fleet (Table 5) are available. These data series essentially formed the base on which length composition of the yellowfin tuna catches of the surface fishery were calculated.

The most complete series of longline length-frequency data for yellowfin tuna are available for the Japanese fleet for the period 1966-1974 (ICCAT, 1973a, 1975c, 1975d). The data were considered representative for the entire longline fleet and were used to estimate the 1966-1974 length composition of all longline catches, except those of Brazil and Argentina for 1973 and 1974. For these exceptions, length-frequency data reported for the Brazilian fleet were used instead (Table 6). Preliminary length-frequency data from the Taiwanese, Korean and Panamanian longline fleets were used to estimate the length composition of longline catches in 1975.

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[1] Fonteneau, A., and W.H. Lenarz. 1974. Cohort analysis of the eastern Atlantic fishery for yellowfin tuna. In ICCAT Collective Volume of Scientific Papers, Vol. 2 (SCRS-1973): 57-77.
The program was originally written to convert fork length to predorsal length and was revised to convert predorsal length to fork length.

Estimation procedures

Estimation of age and length composition of the yellowfin tuna catches was accomplished by utilizing the procedures described by Coan and Sakagawa (1976). Briefly, the procedures are as follows:

Step 1: Length frequency of each sample was standardized into 2-centimeter intervals.

Step 2: All length frequencies were weighted by a factor based on the catch from which the sample was taken. The factor, number of fish in the catch, was computed by dividing the catch in weight by the average weight of fish in the sample. The average weight of fish in the sample was determined by converting the length frequencies to weight frequencies with,

$$W = 0.000021804\ L_f^{2.96989}$$

Where W = weight in kg and L_f = fork length in cm (Lenarz, 1974).

Step 3: Length-frequency samples were stratified by gear, area and quarter to correspond to the stratified total catches.

Step 4: Total numbers of fish by 2-centimeter intervals were calculated by finding the average weight of each stratified length-frequency sample, dividing the stratified catch by the average weight and distributing the total numbers over the stratified length-frequency sample.

Step 5: Total numbers of fish by age were assigned by following modal progressions and by using the growth equation of Le Guen and Sakagawa (1973). The ages and approximate sizes of yellowfin tuna used were as follows:

Group	Age interval (years)	Length interval (cm)
0	0 -1.02	1-31
1	1.02-1.99	31-85
2	1.99-3.00	85-121
3	3.00-4.17	121-151
4	4.17-5.09	151-165
5	5.09-6.06	165-175
6	6.06-7.99	175-185
7	7.99-8.99	185+

LENGTH AND AGE COMPOSITION OF THE CATCH

Surface fishery

Estimates of the number of fish by 2-centimeter intervals were made for 1966-1975. The range of lengths of fish caught by the surface fishery in 1966-1975 was 22-192 cm. The fishery concentrated on small fish between 21-121 cm (Figure 2), or 1- and 2-year-old fish (Table 7). In the earlier years, 1966, 1967 and 1969, 2-year-old fish dominated the surface catches.

In all years catches from the eastern Atlantic exceeded catches from the western Atlantic and in 1966 and 1968-1971 there were no significant catches from the western Atlantic (Table 7). Since no length-frequency samples were available for the surface catches in the western Atlantic, approximate age compositions for catches of this region of the Atlantic were calculated based on the age compositions of the eastern Atlantic catches. A comparison between regions of sizes of fish caught in those years are therefore not valid.

Longline fishery

Estimates of length and age composition of the 1966-1975 longline catches were made for the eastern and western Atlantic. The range of lengths of fish caught in the entire Atlantic by longliners was 43-192 cm (Figure 2). Dominate age groups in the catch were 2-, 3-, and 4-year-old fish (Table 8). In general, the fishery in the western Atlantic catches smaller fish (2- and 3-year olds) than the fishery in the eastern Atlantic (3- and 4-year olds). This difference may be due to the absence of a significant surface fishery that removes young fish in the western Atlantic, whereas a well-developed surface fishery exists in the eastern Atlantic.

LIMITATIONS AND CONCLUSIONS

Aging was done by following modes in the length-frequency distributions and by using the growth curve of LeGuen and Sakagawa (1973) as a guide. This technique relies on subjective judgements in determining the position and extent of a mode. Errors in judgement may have therefore affected the results.

Length-frequency data were substituted where data were unavailable from certain catches. The percentage of catch requiring substitutions ranged from 8 to 86% for the longline fishery and 5 to 100% for the surface fishery (Table 9). These percentages indicate only the overall sampling coverage and not how well the catch was sampled. In some cases, only a few samples were taken from a limited spatial-temporal stratum of catch. Inadequate number of samples as well as improper substitution of samples may have therefore affected the results.

Estimated numbers of fish caught by both the surface and longline fisheries are less than those reported by Coan and Sakagawa (1976). A number of factors can account for the difference. For example, the assumption made by Coan and Sakagawa that the average sizes of fish caught in the eastern and western Atlantic by the longline fishery are the same was not used in this study because size data were available for both regions of the Atlantic. Also, updated length-frequency and catch statistics, and new data were used in the present study. Changes in the data base are probably the major factor for the difference in the results of the two studies.

No attempt was made in this study to stratify the western Atlantic into smaller regions, as was suggested by Coan and Sakagawa. The limited data from this region did not warrant a finer stratification than used in this study.

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Table 2. Summary plan used to partition total yellowfin catches into eastern and western Atlantic. "X" signifies that catch and effort data or other information on fishing area are available for the fleet. Footnotes signify that a substitution of information from a similar fleet is made.

Country	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
Longline										
Argentina			X	X		X	X	X	X	
Brazil						X	X	X	X	
Cuba	1	1	1	1	1	1	1	1	1	2
Japan	X	X	X	X	X	X	X	X	X	2
Korea			X	X	1	1	1	1	1	2
Panama							1	1	1	2
South Africa								X		
Taiwan	1	1	1	1	1	1	X	X	X	2
Venezuela	X	X	X	X	X	X	X	X	X	X
Surface										
Angola	X	X	X	X	X	X	X			
Canada	3	3	3	X	X	X		X		
Cuba						X		X	X	
FIS	X	X	X	X	X	X	X	X	X	X
Ghana							X	X	X	X
Japan	X	X	X	X	X	X	X	X	X	X
Korea								3	3	3
Morocco									X	X
Norway							X	X		
Panama							3	3	3	3
Portugal									X	X
South Africa							X	X		
Spain	3	3	3	3	3	3	3	3	3	3
U.S.A.		X	X	X	X	X	X	X	X	X
Venezuela									X	

[1]Assumed to be the same as for the Japanese fleet.

[2]Assumed to be the same as for the Japanese fleet, 1974

[3]Assumed to be eastern

Table 1. Catches (metric tons) of Atlantic yellowfin tuna by country, gear, region and year, 1966-1975

Country	Region	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975[1]
Longline											
Argentina	Western			100	100		100	400	129	112	
Brazil	Western						348	348	145	219	
Cuba	Western						1,445	2,232	2,385	2,856	3,192
	Eastern						255	1,368	2,115	544	608
Japan	Western	12,610	2,946	4,850	4,912	4,405	9,372	4,667	2,220	3,609	5,040
	Eastern	9,513	9,863	9,007	4,911	2,269	1,654	2,860	1,969	687	960
Korea	Western			1,793	1,436	8,809	8,416	6,868	6,807	13,035	11,362
	Eastern			477	4,546	4,538	1,485	4,210	6,037	2,483	2,164
Panama	Western							58	2,962	2,688	
	Eastern						35	35	2,626	512	
South Africa	Eastern								22		
Taiwan	Western	627	615	2,750	5,399	4,667	3,714	1,223	1,115	1,302	1,774
	Eastern	473	2,058	5,107	5,399	2,404	656	3,482	1,540	1,023	1,393
Venezuela	Western							1,856	1,921	1,210	1,200
Unclassified	Western	3,700	6,248	4,104	3,920	4,036	1,508				1,000
Sub-total longline		26,923	21,730	28,188	30,623	31,128	28,953	29,607	31,993	30,280	28,693
Baitboat											
Angola	Eastern	2,400	1,600	1,600	1,000	400	500	600		6,398	2,329
FIS	Eastern	15,900	14,900	19,900	14,200	8,100	7,800	8,400	5,644	342	567
Ghana	Eastern							2	142	1,180	
Japan	Western	479	1,303	2,151	944	994	2,475	4,425	26	1,338	1,148
	Eastern								8,042	2,169	1,155
Korea	Eastern								900	290	300
Morocco	Eastern							431	125	397	564
Panama	Eastern									449	1,200
Portugal	Eastern									7	
South Africa	Eastern				637	701	420		786	2,032	1,031
Spain	Eastern	3,050		400						98	
Venezuela	Western										
Purse Seine											
Canada	Eastern	646	680	655	936	191	44		61	400	
Cuba	Eastern						400		400	339	
FIS	Western							2,600	1,677	32,766	
	Eastern	7,500	8,900	12,600	14,700	18,000	18,000	24,600	25,023	868	44,245
Japan	Eastern	4,812	5,244	7,463	5,805	1,318	2,232	2,827	1,542	300	145
Norway	Eastern							100	300		
South Africa	Eastern							54	37	28	
Spain	Eastern	2,950	3,000	3,600	5,263	6,399	15,156	8,015	12,816	14,407	22,982
U.S.A.	Western		218					239	356		375
	Eastern		918	5,827	18,791	9,029	3,764	12,103	3,234	5,621	13,960
Unclassified	Eastern							1,750	600	1,421	
Sub-total baitboat & purse seine		37,737	36,763	54,196	62,276	45,132	50,791	66,146	61,711	77,550	90,601

[1]Preliminary

Table 4. Sources of length-frequency samples of yellowfin tuna from the Atlantic Ocean.

Country	Area	Sources of Samples 1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
Longline											
Brazil	Western								7	7	
Cuba	ICCAT-I									11	
	ICCAT-II									11	
	ICCAT-III									11	
Ghana-based	Eastern	6	6	6	6	6	8	7	9	13	12
Japan	Western	6	6	6	6	6	8	7	11	13	12
Korea-Panama	Western								11	12	12
Taiwan	Eastern									12	12
Venezuela	Western				10	10		5	8	7	12
Baitboat											
FIS (ice)	ICCAT-I					3	3	3	4	11	11
	ICCAT-II			2	3	3	3	3	4	11	11
FIS (freezer)	ICCAT-I	2	2	2	3	3	3	3	4	11	11
	ICCAT-II				3	3	3	3	4	11	11
	ICCAT-III				3	3	3	3	4	11	11
Ghana-based	Eastern								9	14	11
Spain	Eastern									11	
Venezuela	Caribbean									7	
Purse Seine											
FIS (small)	ICCAT-I	2	2	2	3	3		3	4	11	11
	ICCAT-II	2	2	2	3	3		3	4	11	11
	ICCAT-III				3	3		3	4	11	11
FIS (large)	ICCAT-I				3	3		3	4	11	11
	ICCAT-II					3		3	4	11	11
	ICCAT-III				3	3		3	4	11	11
Ghana-based	Eastern								9	14	13
Japan	Eastern		5	5	5	6	5	7	7	13	
South Africa	Eastern								8	11	11
Spain	Eastern			1	1	1		1	1	1	15
U.S.A.	NMFS-51			1	1	1	1	1	1	1	15
	NMFS-52				1	1	1	1	1	1	15
	NMFS-53										

[1] Sakagawa, G.T., A.L. Coan, and E.P. Holzapfel (1976)
[2] ORSTOM (1971)
[3] Pers. commun., A. Fonteneau, ORSTOM, Abidjan, Ivory Coast
[4] ORSTOM (1974)
[5] ICCAT (1973b)
[6] ICCAT (1973a)
[7] ICCAT (1975c)
[8] ICCAT (1974b)
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[11] ICCAT (1975d)
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[13] ICCAT pers. commun., ICCAT, Madrid, Spain
[14] Ansa-Emmin (1975)
[15] NMFS, La Jolla, California

Table 3. Summary plan used to partition total yellowfin catches by region into quarters. "X" signifies that catch and effort data are available for the fleet. Footnotes signify that a substitution of information from a similar fleet is made.

Country	Region	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
Longline											
Argentina	western			1	1		1	1	2	2	
Brazil	western	1	1	1	1	1	1	1	X	X	
Cuba	western	1	1	1	1	1	1	1	1	1	3
	eastern	1	1	1	1	1	1	1	1	1	3
Japan	western	X	X	X	X	X	X	X	X	X	3
	eastern	X	X	X	X	X	X	X	X	X	3
Korea	western			X	X	1	1	1	1	1	3
	eastern			X	X	1	1	1	1	1	3
Panama	western							1	1	1	
	eastern							1	1	1	
South Africa	eastern								1		
Taiwan	western	1	1	1	1	1	1	X	X	X	4
	eastern	1	1	1	1	1	1	X	X	X	4
Venezuela	western	1	1	1	1	1	1	1	1	1	5
Baitboat											
Angola	eastern	10	10	10	10	10	10	10			
FIS	eastern	X	X	X	X	X	X	X	X	X	X
Ghana	eastern							10	X	X	10
Japan	eastern	10	10	10	X	10	10	10	9	9	X
Korea	eastern								9	9	10
Morocco	eastern									10	10
Panama	eastern							10	9	9	10
Portugal	eastern									X	
South Africa	eastern									X	
Spain	eastern	10		10	10	10	10		10	10	10
Purse Seine											
Canada	eastern	10	6	6	6	6	6		6		
Cuba	eastern						8		8	8	
FIS	eastern	X	X	X	X	X	X	X	X	X	X
Japan	eastern	10	X	X	X	X	X	X	X	X	X
Norway	eastern							10	10		
South Africa	eastern							10	X	X	
Spain	eastern	10	10	10	10	10	10	10	10	X	10
U.S.A.	eastern		7	X	X	X	X	X	X	X	X

[1] use Japan longline same year
[2] use Brazil longline same year
[3] use Japan longline 1974
[4] use Taiwan longline 1974
[5] use Venezuela longline 1974
[6] use U.S.A. purse seine same year
[7] use U.S.A. purse seine 1968
[8] use Japan purse seine same year
[9] use Ghana-based baitboat same year
[10] use FIS same year

Table 5. Available length-frequency samples (X) and substituted samples (footnotes) of yellowfin tuna for the surface fishery of the eastern Atlantic.

Country	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
Baitboat										
Angola	1	1	1	1	1	1	1	1	1	1
FIS	X	X	X	X	X	X	X	X	X	X
Ghana							1	X	X	1
Japan	1	X	X	1	1	1	1	2	2	X
Korea								2	2	1
Morocco									1	1
Panama							1	2	2	1
Portugal									1	1
South Africa									1	
Spain	1		1	1	1	1		1	1	
Purse Seine										
Canada	3	5	5	5	5	5		5		
Cuba						6		6	6	
FIS	X	X	X	X	X	X	X	X	X	X
Japan	3	X	X	X	X	X	X	X	X	X
Norway							3	3		
South Africa							3	X	X	
Spain	3	3	3	3	3	3	3	3	X	X
U.S.A.		4	X	X	X	X	X	X	X	X

[1] FIS baitboat same year

[2] Ghana-based baitboat same year

[3] FIS purse seine same year

[4] U.S. purse seine 1968

[5] U.S. purse seine same year

[6] Japan purse seine same year

Table 6. Available length-frequency samples (X) and substituted samples (footnotes) of yellowfin tuna for the longline fishery of the eastern and western Atlantic.

Country	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
Eastern										
Cuba	1	1	1	1	1	1	1	1	X	[illegible]
Japan	X	X	X	X	X	X	X	X	X	[illegible]
Korea			1	1	1	1	1	1	1	[illegible]
Panama							1	1	1	
South Africa								1	1	
Taiwan	1	1	1	1	1	1	1	1	1	X
Western										
Argentina			1	1		1	1	2	2	
Brazil	1	1	1	1	1	1	1	X	X	
Cuba	1	1	1	1	1	1	1	1	1	3
Japan	X	X	X	X	X	X	X	X	X	3
Korea			1	1	1	1	1	1	1	X
Panama							1	1	1	X
Taiwan	1	1	1	1	1	1	1	1	1	X
Venezuela	1	1	1	X	X	1	X	X	X	3

[1] Japan longline same year

[2] Brazil longline same year

[3] Taiwan, Korea and Panama longline 1975

Table 9. Tonnage of yellowfin tuna actually sampled for length frequencies and tonnage requiring substitution of length-frequency samples.

Year	Fishery	Atlantic region	Sampled		Substituted		Total	
			X 10^3 metric tons	%	X 10^3 metric tons	%	X 10^3 metric tons	%
1966	Surface	eastern	23.4	62	14.3	38	37.7	100
		western	0	0	0	0	0	0
		total	23.4	62	14.3	38	37.7	100
	Longline	eastern	9.5	92	0.8	8	10.3	100
		western	12.6	76	4.0	24	16.6	100
		total	22.1	82	4.8	18	26.9	100
	Total	eastern	32.9	69	15.1	31	48.0	100
		western	12.6	76	4.0	24	16.6	100
		total	45.5	70	19.1	30	64.6	100
1967	Surface	eastern	30.3	83	6.2	17	36.5	100
		western	0	0	0.2	100	0.2	100
		total	30.3	83	6.4	17	36.7	100
	Longline	eastern	9.9	70	4.3	30	14.2	100
		western	2.9	39	4.6	61	7.5	100
		total	12.8	59	8.9	41	21.7	100
	Total	eastern	40.2	79	10.5	21	50.7	100
		western	2.9	38	4.8	62	7.7	100
		total	43.1	74	15.3	26	58.4	100
1968	Surface	eastern	47.9	88	6.3	12	54.2	100
		western	0	0	0	0	0	0
		total	47.9	12	6.3	12	54.2	100
	Longline	eastern	9.0	57	6.8	43	15.8	100
		western	4.8	39	7.6	61	12.4	100
		total	13.8	49	14.4	51	28.2	100
	Total	eastern	56.9	81	13.1	19	70.0	100
		western	4.8	39	7.6	61	12.4	100
		total	61.7	75	20.7	25	82.4	100
1969	Surface	eastern	53.5	86	8.8	14	62.3	100
		western	0	0	0	0	0	0
		total	53.5	86	8.8	14	62.3	100
	Longline	eastern	4.9	31	10.7	69	15.6	100
		western	6.8	45	8.2	55	15.0	100
		total	11.7	38	18.9	62	30.6	100
	Total	eastern	58.4	75	19.5	25	77.9	100
		western	6.8	45	8.2	55	15.0	100
		total	65.2	70	27.7	30	92.9	100
1970	Surface	eastern	36.4	81	8.7	19	45.1	100
		western	0	0	0	0	0	0
		total	36.4	81	8.7	19	45.1	100
	Longline	eastern	2.3	23	7.5	77	9.8	100
		western	6.0	28	15.3	72	21.3	100
		total	8.3	27	22.8	73	31.1	100
	Total	eastern	38.7	70	16.2	30	54.9	100
		western	6.0	28	15.3	72	21.3	100
		total	44.7	59	31.5	41	76.2	100
1971	Surface	eastern	31.8	63	19.0	37	50.8	100
		western	0	0	0	0	0	0
		total	31.8	63	19.0	37	50.8	100
	Longline	eastern	1.6	40	2.4	60	4.0	100
		western	9.4	38	15.5	62	24.9	100
		total	11.0	38	17.9	62	28.9	100
	Total	eastern	33.4	61	21.4	39	54.8	100
		western	9.4	38	15.5	62	24.9	100
		total	42.8	54	36.9	46	79.7	100
1972	Surface	eastern	47.9	76	15.4	24	63.3	100
		western	0	0	2.8	100	2.8	100
		total	47.9	72	18.2	28	66.1	100
	Longline	eastern	2.9	24	9.1	76	12.0	100
		western	6.5	37	11.1	63	17.6	100
		total	9.4	32	20.2	68	29.6	100
	Total	eastern	50.8	67	24.5	33	75.3	100
		western	6.5	32	13.9	68	20.4	100
		total	57.3	60	38.4	40	95.7	100
1973	Surface	eastern	35.6	60	24.1	40	59.7	100
		western	0	0	2.0	100	2.0	100
		total	35.6	58	26.1	42	61.7	100
	Longline	eastern	2.0	14	12.3	86	14.3	100
		western	4.3	24	13.4	76	17.7	100
		total	6.3	20	25.7	80	32.0	100
	Total	eastern	37.6	51	36.4	49	74.0	100
		western	4.3	22	15.4	78	19.7	100
		total	41.9	45	51.8	55	93.7	100
1974	Surface	eastern	60.4	78	16.7	22	77.1	100
		western	0	0	0.4	100	0.4	100
		total	60.4	78	17.1	22	77.5	100
	Longline	eastern	1.2	23	4.0	77	5.2	100
		western	5.0	20	20.0	80	25.0	100
		total	6.2	21	24.0	79	30.2	100
	Total	eastern	61.6	75	20.7	25	82.3	100
		western	5.0	20	20.4	80	25.4	100
		total	66.6	62	41.1	38	107.7	100
1975	Surface	eastern	85.4	95	4.8	5	90.2	100
		western	0	0	0.4	100	0.4	100
		total	85.4	94	5.2	6	90.6	100
	Longline	eastern	3.6	71	1.5	29	5.1	100
		western	13.1	56	10.5	44	23.6	100
		total	16.7	58	12.0	42	28.7	100
	Total	eastern	89.0	93	6.3	7	95.3	100
		western	13.1	55	10.9	45	24.0	100
		total	102.1	86	17.2	14	119.3	100