AMERICAN PARTICIPATION IN TUNA FISHERY OF EASTERN TROPICAL ATLANTIC

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In the 1950s and early 1960s, Canadian and United States tuna vessels fished in the eastern tropical Atlantic on an exploratory basis. It was not until 1967 that a significant number of American (Canada, Panama, and U.S.) vessels entered the fishery. The fleet started with three boats in 1967 and increased to 24 boats in 1971 (Table 1). All but one have been purse seiners with capacity greater than 400 metric tons. Their catches have been almost exclusively yellowfin (Thunnus albacares) and skipjack (Katsuwonus pelamis) tunas. This report reviews the development of the yellowfin and skipjack tuna fisheries of the eastern tropical Atlantic with respect to the operations of the American fleet.

THE FISHERY

The area off west Africa between 25° N and 25° S latitude and east of 25° W longitude (Figure 1) is defined as the eastern tropical Atlantic. Many of the Atlantic tropical tunas, especially yellowfin and skipjack tunas, are caught there. The fishery was a local, subsistence industry until 1955. Then, French baitboats that traditionally had fished for albacore off southern Europe ventured south to fish for tropical tunas in the Dakar, Senegal region. The following year the Japanese longline fleet entered the fishery. Today, the fishery consists of baitboats and purse seiners of Canada, France, Ivory Coast,

Table 1. Catch (metric tons) and catch rate (catch/day's fishing)[1/] of yellowfin and skipjack tunas caught by American seiners in the eastern tropical Atlantic

Year	Number of seiners	Yellowfin		Skipjack		Total	
		Catch	Catch rate	Catch	Catch rate	Catch	Catch rate
1967	3	978	7.6	473	3.7	1,451	11.3
1968	8	6,198	23.3	3,193	12.0	9,391	35.3
1969	25	19,845	10.9	4,440	2.4	24,285	13.3
1970	23	9,065	4.0	11,423	5.1	20,488	9.1
1971	24	3,750	2.5	16,875	10.3	20,625	12.8

[1/] Catch rates for the American fleet are for large purse seiners. The rates are not directly comparable to those in Table 4 for the FIS seiners, because the catch rates of the FIS seiners are based on total effort of large and small seiners, which have different fishing powers.

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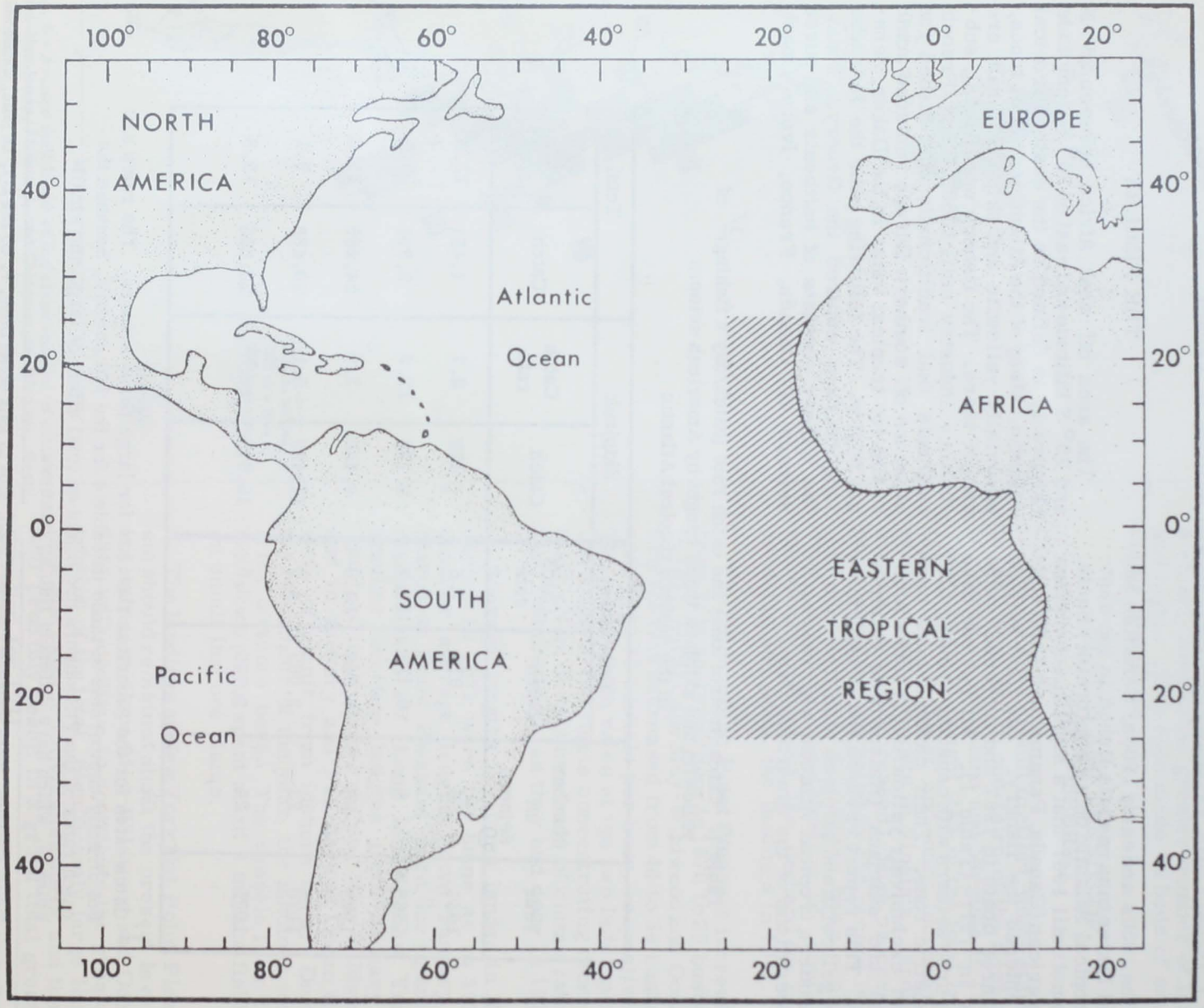

Fig. 1 - Map of the Atlantic Ocean showing the eastern tropical region.

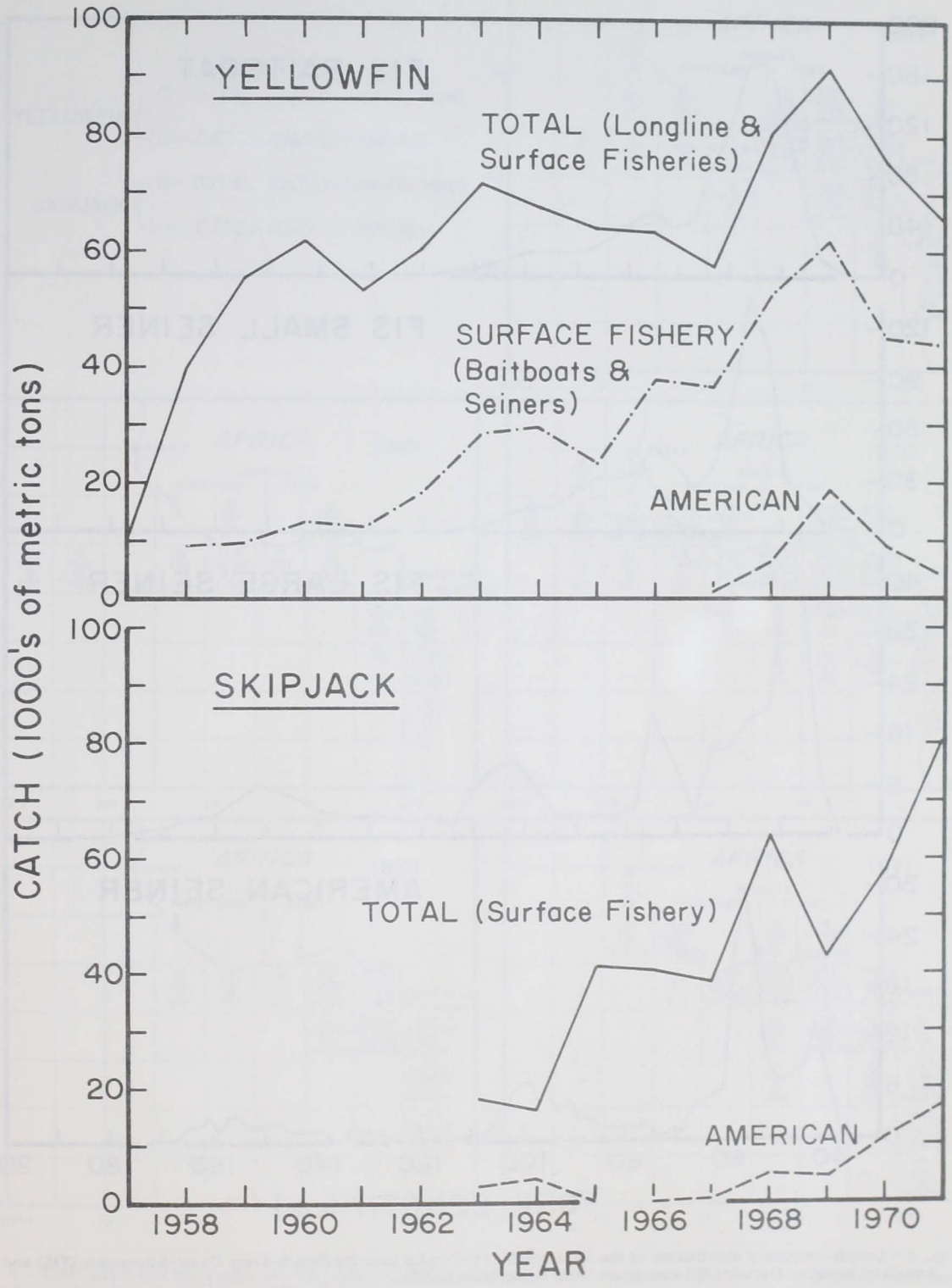

Fig. 2 - Catch of yellowfin and skipjack tunas from the Atlantic Ocean. Source of data is from Anonymous (1972).

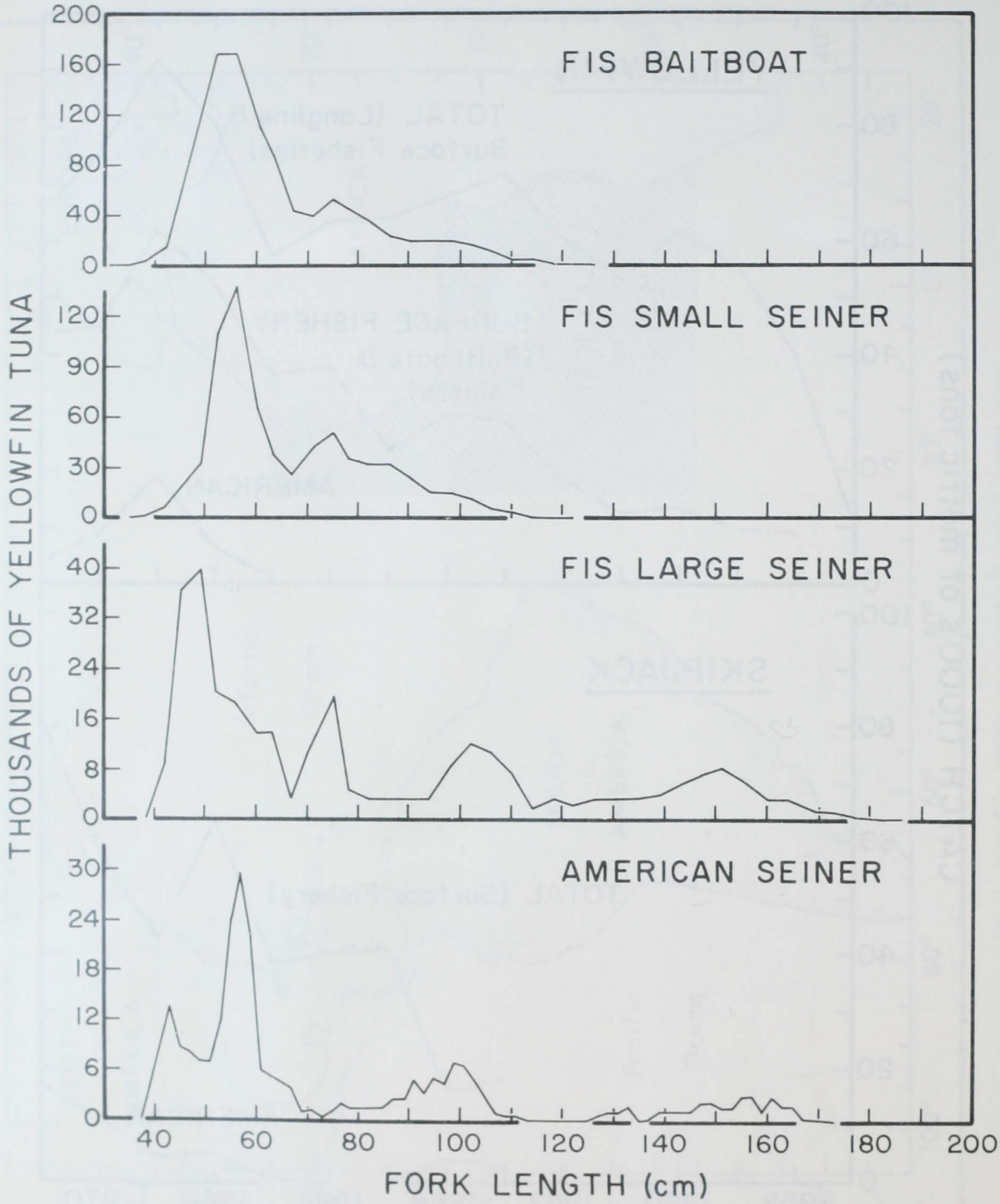

Fig. 3 - Length-frequency distribution of the 1971 catch of yellowfin tuna for French-Ivory Coast-Senegalese (FIS) and American vessels. Data for FIS vessels are from Anonymous (1972).

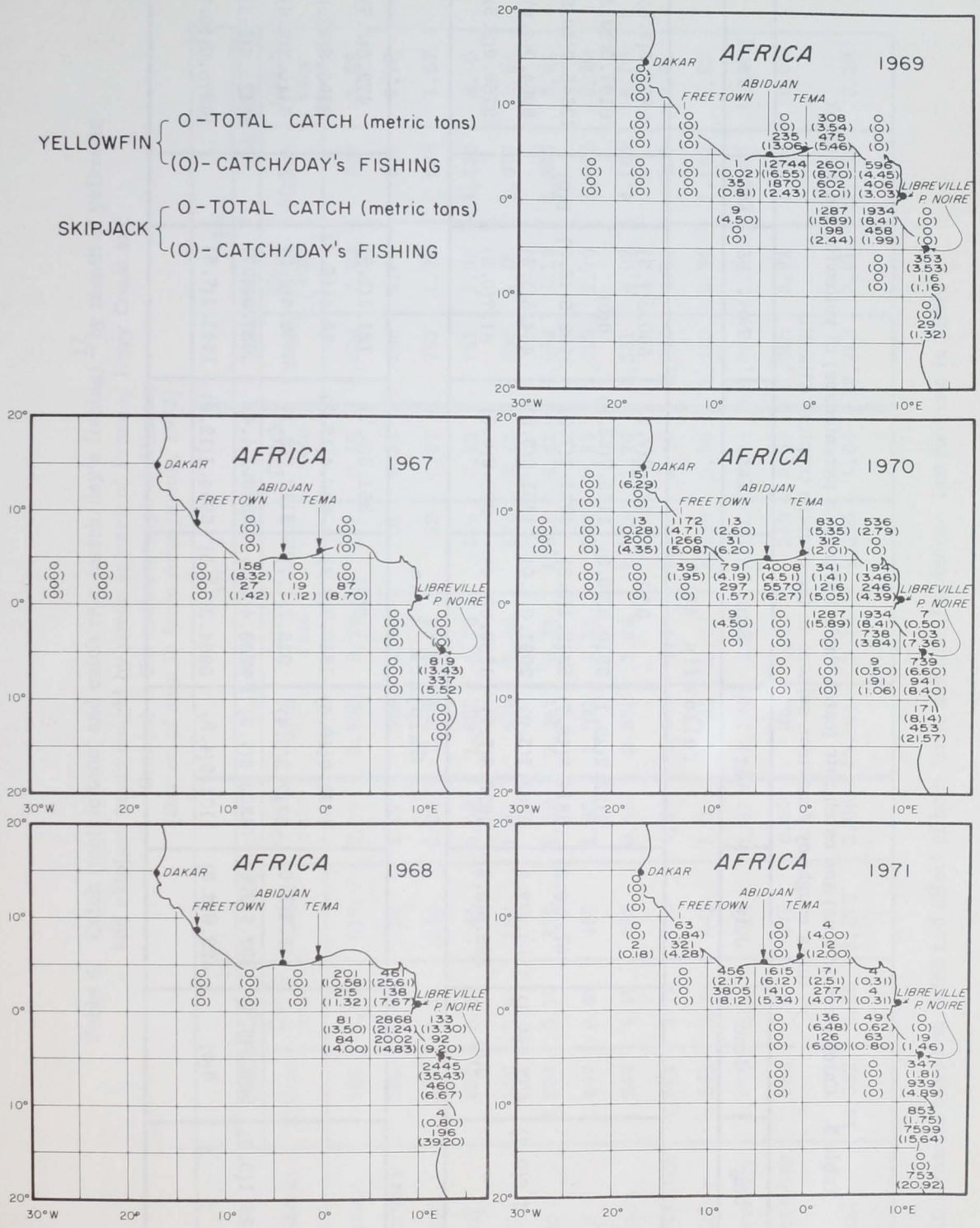

Fig. 4 - Total catch (metric tons) and catch rate (catch/day's fishing), in parentheses, of yellowfin and skipjack tunas caught by American seiners in 1967-71 by 5^{o} x 5^{o} areas.

Table 3. Catch (metric tons) and catch rate (catch/day's fishing, in parentheses) of yellowfin and skipjack tunas caught by American seiners in the eastern tropical Atlantic

Year	May	June	July	Aug	Sept.	Oct.	Nov.	Dec.	Total
Yellowfin tuna									
1967					0(0)	477.2(7.7)	500.3(7.9)		977.5(7.6)
1968				2122.2(29.1)	2910.0(20.3)	1165.7(23.8)	0(0)		6197.9(23.3)
1969			607.8(6.3)	6814.8(16.7)	5219.1(9.9)	4011.1(7.5)	3192.3(13.3)	0(0)	19845.2(10.9)
1970	3.6(0.7)	633.2(4.1)	1458.4(3.3)	2963.1(5.0)	2091.0(4.0)	1451.2(3.5)	464.5(3.5)		9064.9(4.0)
1971		0(0)	398.6(6.5)	1620.8(7.7)	1350.0(2.4)	298.9(0.6)	81.7(0.5)		3750.0(2.5)
Skipjack tuna									
1967					0(0)	351.5(5.7)	121.1(1.9)		472.6(3.7)
1968				1211.8(16.6)	1319.8(9.2)	646.4(13.2)	15.4(15.4)		3193.3(12.0)
1969			146.1(1.5)	2217.2(5.4)	918.7(1.7)	1113.0(2.1)	45.4(0.2)	0(0)	4440.3(2.4)
1970	28.1(5.6)	986.2(6.4)	1332.6(3.0)	4303.6(7.3)	2289.4(4.4)	1846.3(4.4)	637.3(4.7)		11423.4(5.1)
1971		0(0)	423.6(6.3)	1101.9(4.8)	6964.3(11.5)	6944.1(12.9)	1441.1(7.5)		16875.0(10.3)

Table 4. Catch (metric tons) and catch rate (catch/day's fishing) [1] by month of yellowfin and skipjack tunas caught by purse seiners of France, Ivory Coast and Senegal in the eastern tropical Atlantic
(Source of data is from Anonymous, 1972)

Month	1969				1970				1971			
	Yellowfin		Skipjack		Yellowfin		Skipjack		Yellowfin		Skipjack	
	Catch	Catch rate	Catch	Catch rate	Catch	Catch rate	Catch	Catch rate	Catch	Catch rate	Catch	Catch rate
January	926	3.63	516	2.02	2,835	6.70	171	0.40	1,204	2.03	825	1.39
February	535	3.99	157	1.17	529	1.90	91	0.33	963	1.85	579	1.11
March	523	6.32	244	2.95	1,302	3.02	29	0.07	787	1.79	688	1.57
April	657	6.69	41	0.42	1,051	1.76	375	0.63	751	1.35	1,138	2.05
May	669	5.04	186	1.40	678	2.49	670	2.46	637	1.09	1,077	1.84
June	3,254	10.75	179	0.59	2,247	5.38	1,841	4.41	2,053	4.19	1,675	3.41
July	1,692	6.61	499	1.95	1,091	2.36	396	0.86	1,409	2.70	1,672	3.20
August	1,842	4.17	389	0.88	2,202	3.34	1,162	1.76	3,331	4.97	4,144	6.19
September	1,391	2.72	139	0.27	2,643	4.77	1,328	2.40	2,243	4.85	928	2.01
October	842	2.44	442	1.28	1,735	2.88	1,845	3.06	1,413	2.30	1,182	1.92
November	1,073	2.56	614	1.47	1,190	1.99	1,130	1.89	1,033	1.59	7,355	11.33
December	988	2.04	272	0.56	391	0.99	268	0.68	1,888	2.71	1,796	2.58
Total	14,392	4.16	3,678	1.06	17,894	3.14	9,306	1.64	17,712	2.61	23,059	3.39

[1] Catch rate is based on catch and effort of both large and small seiners. See footnote in Table 1.

Table 5. Catch (metric tons) and catch rate (catch/day's fishing), by month of yellowfin and skipjack tunas caught by baitboats of France, Ivory Coast and Senegal in the eastern tropical Atlantic (Source of data is from Anonymous, 1972)

Month	1969				1970				1971			
	Yellowfin		Skipjack		Yellowfin		Skipjack		Yellowfin		Skipjack	
	Catch	Catch rate	Catch	Catch rate	Catch	Catch rate	Catch	Catch rate	Catch	Catch rate	Catch	Catch rate
January	2,819	2.63	449	0.42	740	0.84	260	0.30	474	0.89	600	1.12
February	1,696	1.78	128	0.13	619	1.15	209	0.39	251	0.72	241	0.69
March	1,390	1.46	225	0.24	511	0.64	93	0.12	328	0.60	83	0.15
April	1,337	1.64	47	0.06	616	0.99	418	0.67	232	0.61	266	0.70
May	910	1.36	543	0.81	510	0.95	365	0.68	455	1.01	382	0.85
June	986	1.33	319	0.43	637	1.09	327	0.56	1,118	1.96	288	0.51
July	1,121	1.23	401	0.44	1,039	1.81	270	0.47	1,106	2.18	393	0.77
August	627	1.00	226	0.36	733	1.35	350	0.65	839	1.40	777	1.30
September	908	1.11	742	0.91	678	1.16	594	1.01	1,200	2.64	1,024	2.26
October	802	1.08	709	0.96	650	1.37	777	1.64	567	1.38	742	1.81
November	661	0.94	565	0.81	614	1.23	564	1.13	661	1.33	602	1.21
December	840	0.86	246	0.25	537	0.99	515	0.95	586	1.22	583	1.21
Total	14,097	1.41	4,600	0.46	7,884	1.10	4,742	0.66	7,817	1.35	5,981	1.03

Coast-Senegalese (FIS) baitboats and seiners are shown in Figure 3 (Anonymous, 1972). Fish caught by the American seiners are comparable in size to fish caught by FIS large seiners (> 400 metric tons capacity). They are different from sizes of fish caught by FIS baitboats and small seiners (< 400 metric tons capacity). The large seiners caught larger fish than the small seiners and baitboats. The reason is that large seiners use a larger and deeper net that catches the large, deep-swimming individuals of a school that fishing gears of small seiners or baitboats cannot catch.

Skipjack Tuna

The skipjack tuna resource of the Atlantic Ocean is considered to be large and underexploited (FAO, 1968). In the period 1965-71, the total annual catch averaged around 52,200 metric tons. The annual American catch prior to 1970 was under 5,000 metric tons. In 1970, the catch increased substantially to 11,400 metric tons, and to 16,900 metric tons in 1971. As with the American Atlantic catch of yellowfin tuna, most of the American Atlantic catch of skipjack tuna since 1966 has been from the eastern tropical region.

In American landings, the species mixture has changed from predominately yellowfin tuna in the 1960s to skipjack tuna in the 1970s (Table 2). This shift does not appear to be as pronounced in catches of other fleets that fished in eastern tropical Atlantic.

Table 6. Average catch rate (metric tons/day's fishing) of yellowfin and skipjack tuna for American purse seiners (1967-71) and French-Ivory Coast-Senegalese (FIS) purse seiners and baitboats (1969-71). The maximum catch rates are underlined

Month	Yellowfin			Skipjack		
	American seiner	FIS		American seiner	FIS	
		seiner	baitboat		seiner	baitboat
January	-	3.91	1.63	-	1.19	0.53
February	-	2.17	1.40	-	0.89	0.31
March	-	2.74	0.97	-	1.01	0.17
April	-	1.07	1.20	-	1.24	0.40
May	0.72	2.01	1.13	5.62	1.95	0.78
June	3.96	6.24	1.45	6.16	3.05	0.49
July	4.13	3.38	1.64	3.19	2.07	0.53
August	10.11	4.16	1.24	6.93	3.22	0.76
September	6.64	4.11	1.50	6.59	1.57	1.27
October	4.76	2.56	1.24	7.00	2.22	1.37
November	6.94	1.08	1.14	3.70	5.46	1.02
December	0	2.07	0.98	0	1.48	0.67

Japan, Norway, Panama, Portugal, Senegal, Spain, and the U.S.--and longliners of Korea, Japan, and Taiwan.

THE CATCHES

Yellowfin Tuna

In 1971, the total catch of yellowfin tuna from the Atlantic was 67,600 metric tons (Figure 2). This was lower than the high of 92,400 metric tons caught in 1969, and slightly lower than the 1961-70 average of 68,500 metric tons.

Since 1967, the American catch of Atlantic yellowfin tuna has been almost entirely from the eastern tropical Atlantic. The catch was 1,000 metric tons in 1967. It reached a high of 19,800 metric tons in 1969, dropped to 9,100 metric tons in 1970, and declined further to 3,800 metric tons in 1971 (Table 1). The decline in 1970 was due in part to a shift of fishing effort to skipjack tuna. The 1971 catch decline probably was due to a combination of decreased yellowfin fishing effort and increased availability of skipjack tuna.

The sizes of yellowfin tuna caught in 1971 by the American seners and French-Ivory

Table 2. Proportion of yellowfin and skipjack tunas in the combined catch (metric tons) of both species from the eastern tropical Atlantic

Nation and type of vessel	Year	Yellowfin Catch		Skipjack Catch		Total	
		Catch	%	Catch	%	Catch	%
French	1969	26,370	77.0	7,855	23.0	34,225	100
baitboat and	1970	21,400	65.1	11,449	34.9	32,849	100
purse seiner	1971	20,091	56.1	15,722	43.9	35,813	100
Ivory Coast							
baitboat and	1970	590	58.9	412	41.1	1,002	100
purse seiner	1971	1,126	57.0	848	43.0	1,974	100
Japanese	1963	900	8.9	9,200	91.1	10,100	100
baitboat	1964	2,600	45.6	3,100	54.4	5,700	100
and two-boat	1965	2,400	22.9	8,100	77.1	10,500	100
purse seiner	1966	5,300	47.7	5,800	52.3	11,100	100
	1967	6,500	52.4	5,900	47.6	12,400	100
	1968	7,900	36.7	13,600	63.3	21,500	100
	1969	6,800	53.5	5,900	46.5	12,700	100
	1970	2,400	24.2	7,500	75.8	9,900	100
	1971	5,300	26.5	14,700	73.5	20,000	100
Senegalese	1969	2,519	79.6	645	20.4	3,164	100
baitboat and	1970	4,000	65.7	2,091	34.3	6,091	100
purse seiner	1971	4,676	61.9	2,880	38.1	7,556	100
American	1967	978	67.4	473	32.6	1,451	100
purse seiner	1968	6,198	66.0	3,193	34.0	9,391	100
	1969	19,845	81.7	4,440	18.3	24,285	100
	1970	9,065	44.2	11,423	55.8	20,488	100
	1971	3,750	18.2	16,875	81.8	20,625	100

LIMITED FISHING SEASON

Although tuna vessels of other nations, France and Spain, for example, fish in the eastern tropical Atlantic most of the year, the American fleet has fished there only during summer and fall (Table 3). The season for the American fleet is dictated largely by events in the eastern tropical Pacific. Most boats of the American fleet are based in California. They fish the eastern tropical Pacific from January until the yellowfin tuna catch quota is reached (Joseph, 1970). Since the catch rates in the eastern tropical Pacific are high, there has not been any incentive for the American boats to fish the more distant fishing grounds in the Atlantic before the close of the yellowfin season in the eastern Pacific.

The peak season (1967-71) for the American fleet has been August to November (Table 3). Peak season (1969-71) for the FIS fleet (baitboats and seiners) that fish year round has been summer and fall (Tables 4 and 5). Therefore, it appears that the American fleet is fishing during the period when yellowfin and skipjack tunas are most available in the areas presently being fished.

FISHING AREAS & CATCH RATES

The catch and catch rate for 1967-71 by 5^{o} x 5^{o} areas for the American fleet are shown in Figure 4. The distribution of catches indicates that yellowfin and skipjack tunas are caught close inshore; most of the catch is made in the Gulf of Guinea. In 1971, a substantial amount of skipjack tuna also was caught off Angola. That was the first year in which the American fleet fished heavily (about 711 day's fishing) off Angola (south of 10^{o} S); all its effort was concentrated in September and October. The results, therefore, cannot be judged at this time as typical for areas off Angola.

The catch rates for 5^{o} x 5^{o} areas range from 0-34 metric tons/day's fishing for yellowfin tuna and 0-39 metric tons/day's fishing for skipjack tuna. The higher rates generally are associated with areas of low fishing effort. However, for some areas, such as off Angola in 1971 and off the Ivory Coast in 1969, the catch rate was high even when the fishing effort was high.

Discussion

There is some evidence--decreasing catch per unit of effort with increase in effort, and smaller average sizes of fish in the catch--that suggests that the total catch of yellowfin tuna from the eastern tropical Atlantic would not increase appreciably if fishing effort is increased within the areas presently fished by each type of vessel (Anonymous, 1972). However, if the distribution of yellowfin tuna in the Atlantic is similar to that in the Pacific, the catch might presumably increase if the surface fishery (baitboats and seiners) is extended farther offshore into areas presently fished only by longliners.

From the point of fishing strategy of the American fleet, the question might be raised whether extending the fishing season would result is an appreciable increase in the fleet's catch and catch rate. Results for the FIS fleet suggest that this is possible (Tables 4 and 5). Most of the French catch of yellowfin and skipjack tunas are made during June to January, and the catch rates are relatively high (Table 6). On the other hand, the American catch and effort are concentrated in August to November. Thus, if the American fleet extends its fishing season into December and January, the fleet's total catch and catch rate probably would be increased.

Acknowledgments

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