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A JAPANESE HIGH-SEAS SALMON FISHERY IN THE NORTH PACIFIC SINCE 1952

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BACKGROUND

By this time Japanese fishing interests have dispatched the seventh salmon fishing expedition into the North Pacific Ocean and the Bering Sea since the inception of the International Convention for the High Seas Fisheries of the North Pacific Ocean. In the early years the performance and areas of operation of these expeditions were of extreme interest to those concerned with the utilization and management of and research on the salmon stocks of North America. Grave concern was felt when in 1955 the Japanese high-seas catch exceeded 60 million salmon, followed by catches of over 50 million fish in 1956 and 1957. Furthermore, research on the geographic origin of races of salmon taken on the high seas has added credence to the contention that some Bristol Bay red salmon are being exploited by this fishery. Because of widespread interest in this fishery and because of its obvious effect on the fishery economy of our Pacific Coast, the Japanese high-seas salmon fishery is reviewed in this article.

FISHING AREAS

Figure 1 shows treaty lines and authorized Japanese fishing areas. The areas of operation of the Japanese high-seas salmon fleets for the fishing seasons 1952 through 1957 are shown in figures 2 to 7. These areas, divided into 30-minute longitudinal and latitudinal blocks, indicate the periods of fishing.

The movement of the fleets during the six years has been generally from east to west. The fishery begins the middle of May at 178° E. longitude and ends mid-August about 50 miles off the east coast of Kamchatka. Generally the pattern of fishing was similar from 1952 to 1955, except that the area between Agattu Island and Kiska Island, south to about 50° N. latitude, was fished in 1952 and apparently not in the three succeeding years (figures 3, 4, and 5).

Although the authorized fishing areas for 1952 through 1955 extended to 48° N., it was not until 1955 that the southernmost areas were heavily fished. Figure 5 shows the concentration of effort along this southern limit throughout the entire fishing season. The following year (1956) the Japanese Fishery Agency increased the fishing area by changing the southern boundary from 48° N. to 46° N. (figure 6).

From the standpoint of fleet operation, 1956 (fig. 6) was an atypical year. Because of the declaration of the Edict Line[1/] by the Soviet Council of Ministers, the

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1/RUSSIAN EDICT LINE--1956--RESTRICTED JAPANESE FROM FISHING IN THAT AREA UNTIL MIDDLE OF JULY.

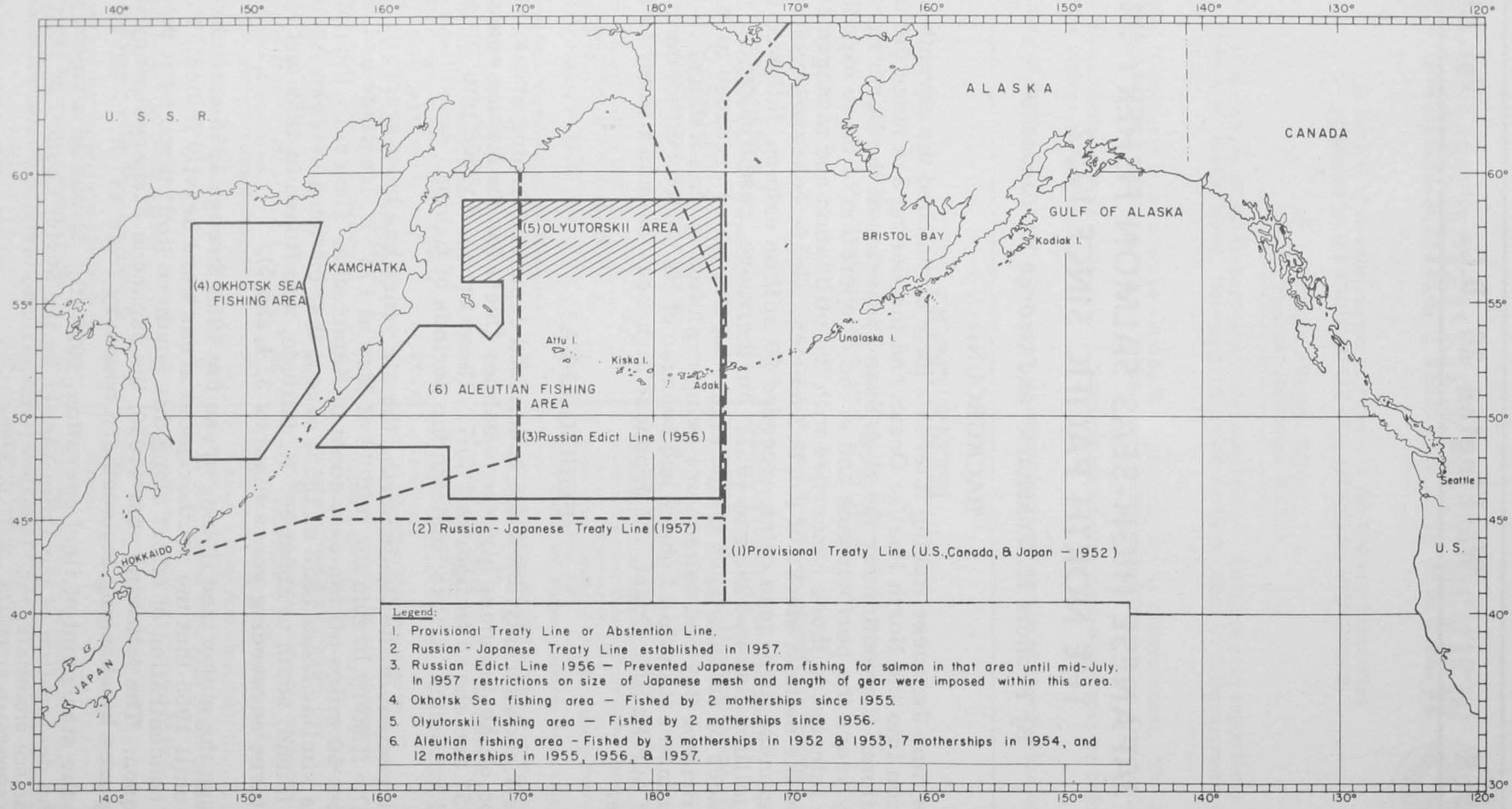


FIG. 1 TREATY LINES AND JAPANESE HIGH-SEAS SALMON FISHING AREAS.

areas immediately south of the Aleutian Islands were more extensively fished and for the first time since the ratification of the Tripartite Treaty, waters east of 180° were fished. Also for the first time, the expedition fished north of the Aleutian Islands and two additional motherships fished in a new administrative district called Olyutorskii region (shown in fig. 1). The fishing areas indicated in figure 6 were the average positions per five-day periods. Had daily positions of the motherships been available, this figure would undoubtedly show more comprehensive area coverage.

In 1957 (fig. 7) the fleet movement was from southwest to northeast during the month of May and early June. In June the fleets separated into two groups, one group heading west and the other, a larger group, moving into the Bering Sea north of Kiska and Attu Islands. Two motherships of the latter group were subsequently

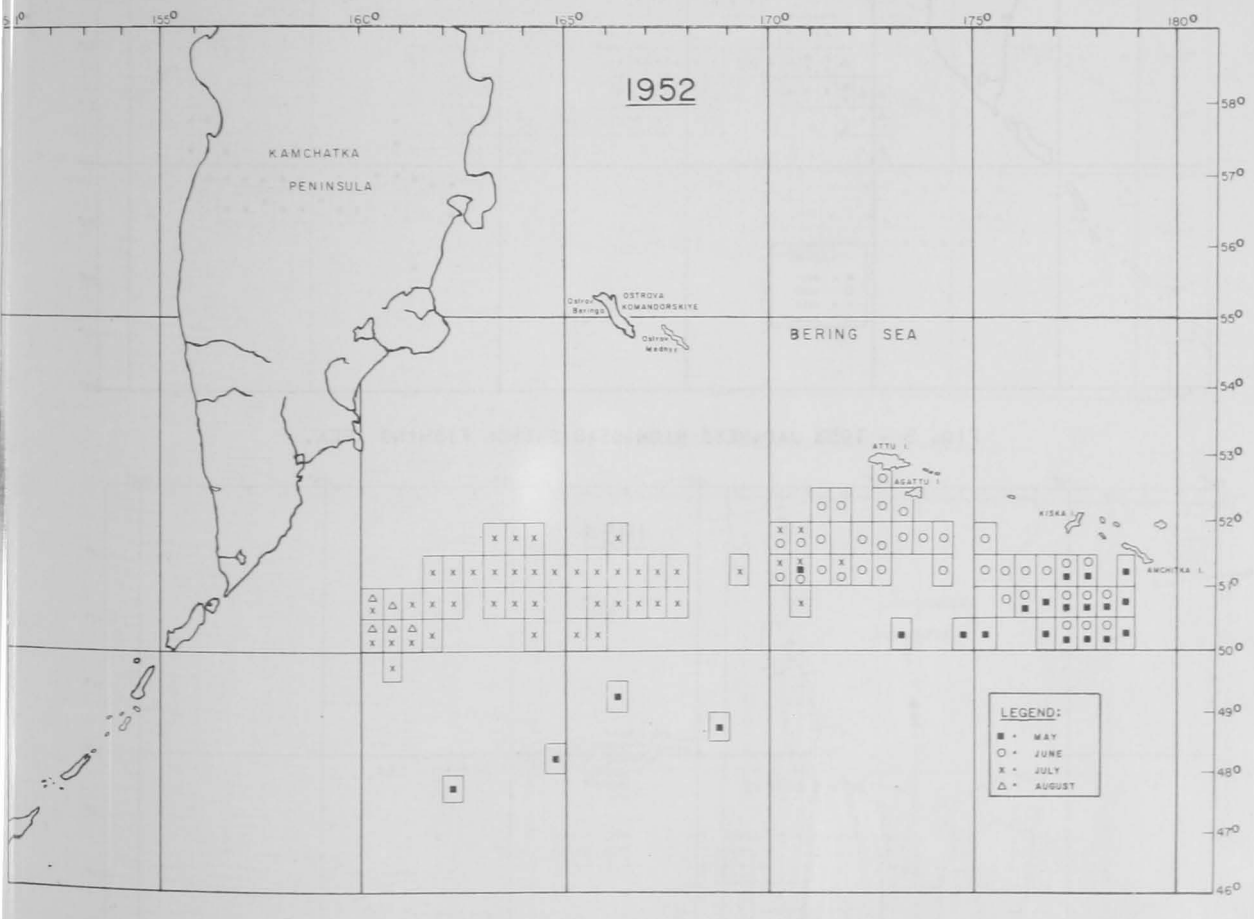


FIG. 2 - 1952 JAPANESE HIGH-SEAS SALMON FISHING AREA.

dispatched to the Olyutorskii district. The reason for the concentration of the larger part of the expedition in the Bering Sea north of Kiska and Attu during June 1957 is explained in a newspaper report by the following comment: "For the twenty days prior to July 1, most of the fleets were concentrated north of the Aleutian Islands. This is unprecedented since salmon fishing began in 1952 and probably is due to large schools of red salmon seen in that area." 2/

Most of the North Pacific salmon fleet in 1957 achieved its quota about the middle of July and the last mothership left the fishing ground on July 25, the earliest termination date in the history of this fishery.

2/SUMMARY FROM HOKKAI SUISAN SHIMBUN, SPECIAL ISSUE NO. 6, JULY 5, 1957.

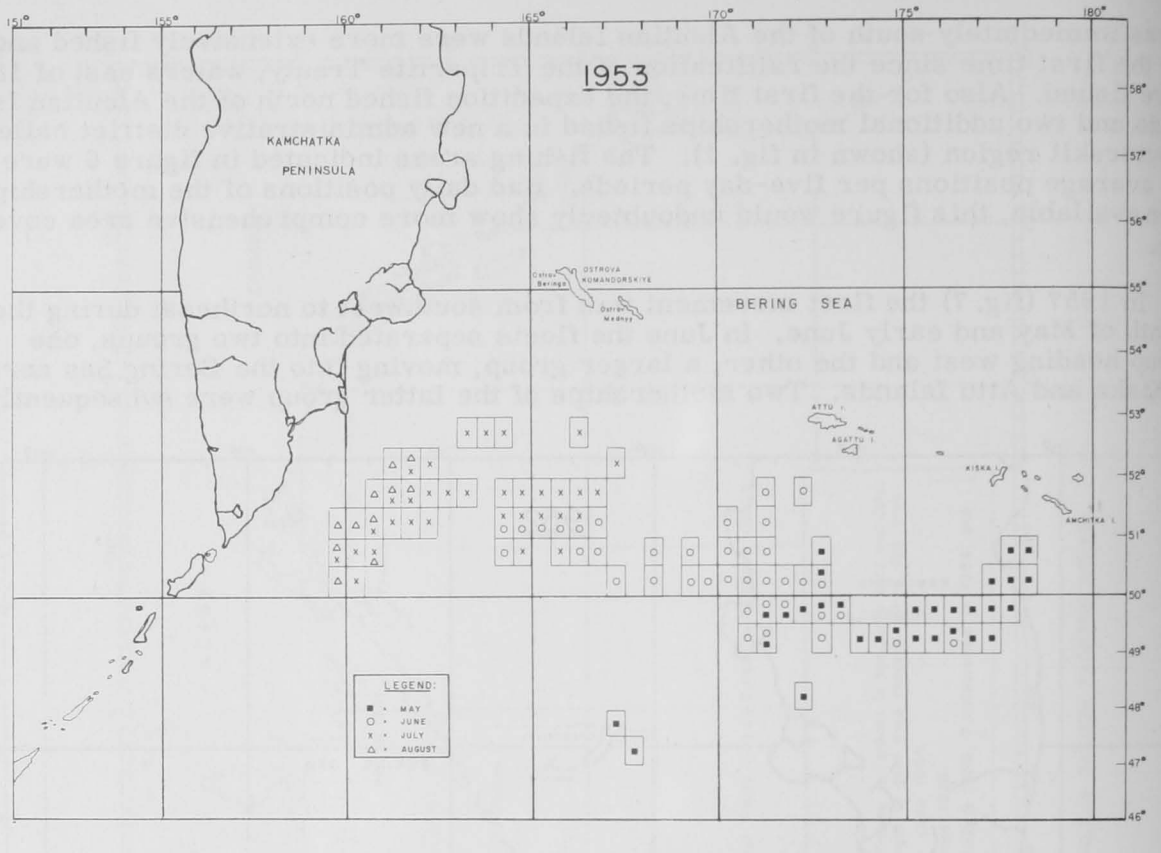


FIG. 3 - 1953 JAPANESE HIGH-SEAS SALMON FISHING AREA.

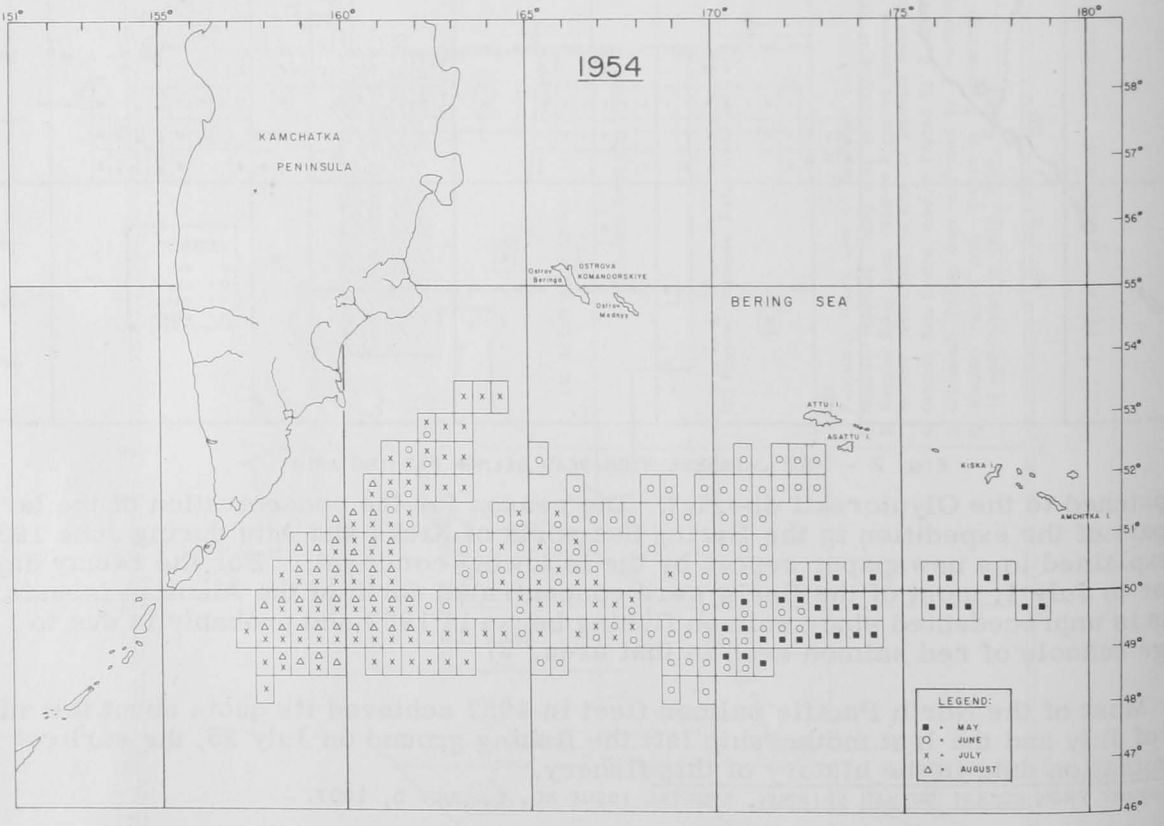


FIG. 4 - 1954 JAPANESE HIGH-SEAS SALMON FISHING AREA.

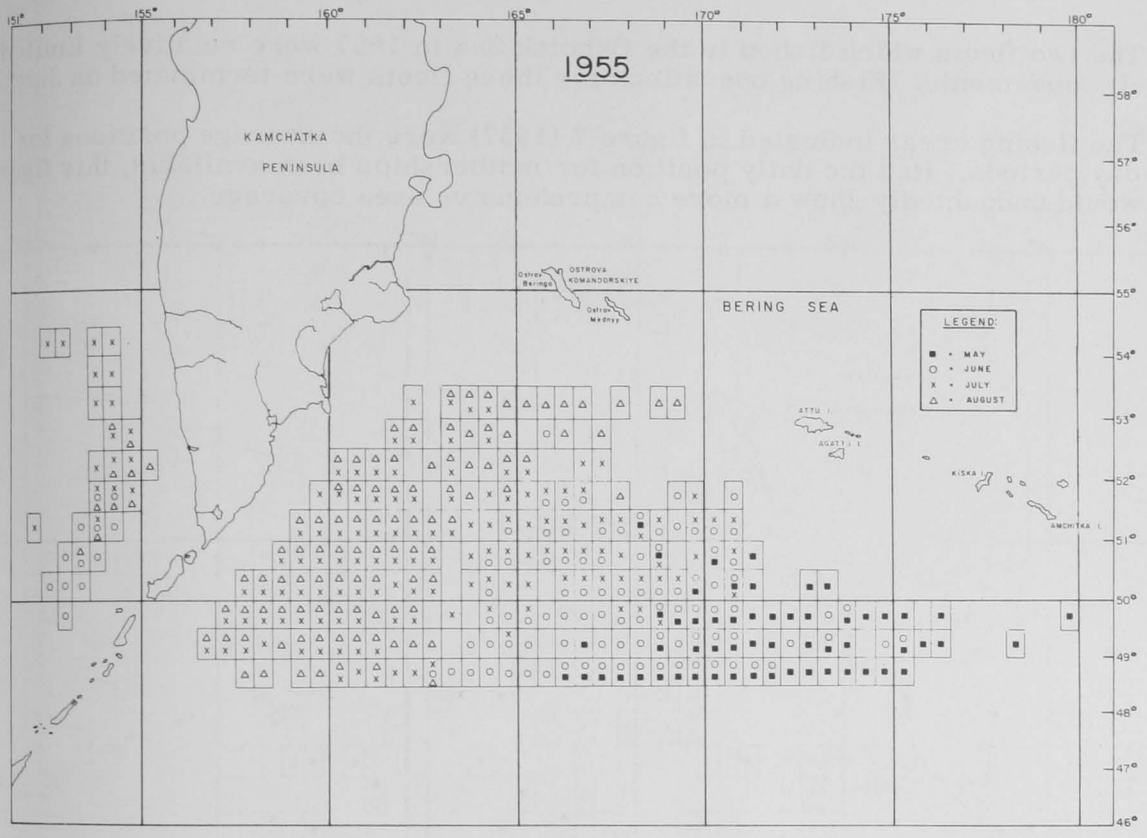


FIG. 5 - 1955 JAPANESE HIGH-SEAS SALMON FISHING AREA.

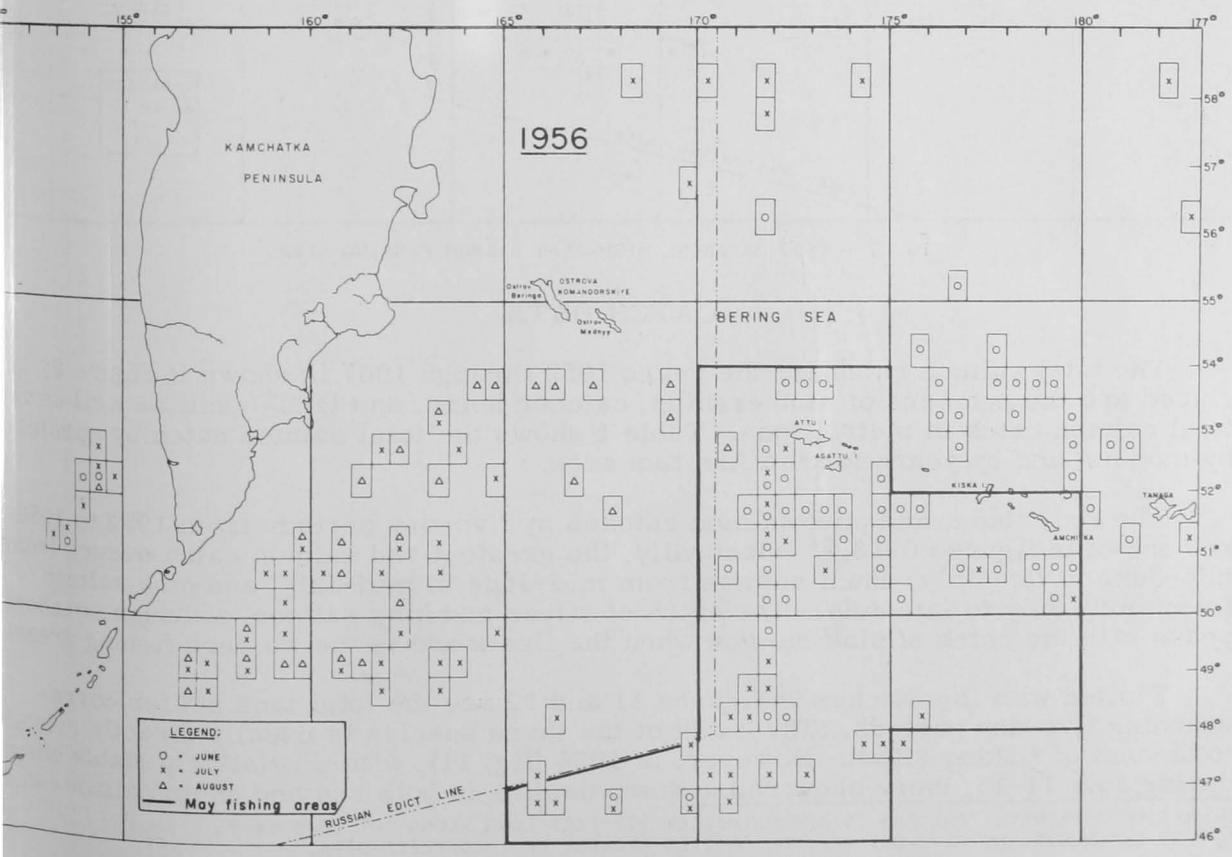


FIG. 6 - 1956 JAPANESE HIGH-SEAS SALMON FISHING AREA.

The two fleets which fished in the Okhotsk Sea in 1957 were relatively limited in their movements. Fishing operations for these fleets were terminated on July 31.

The fishing areas indicated in figure 7 (1957) were the average positions for five-day periods. Had the daily position for motherships been available, this figure also would undoubtedly show a more comprehensive area coverage.

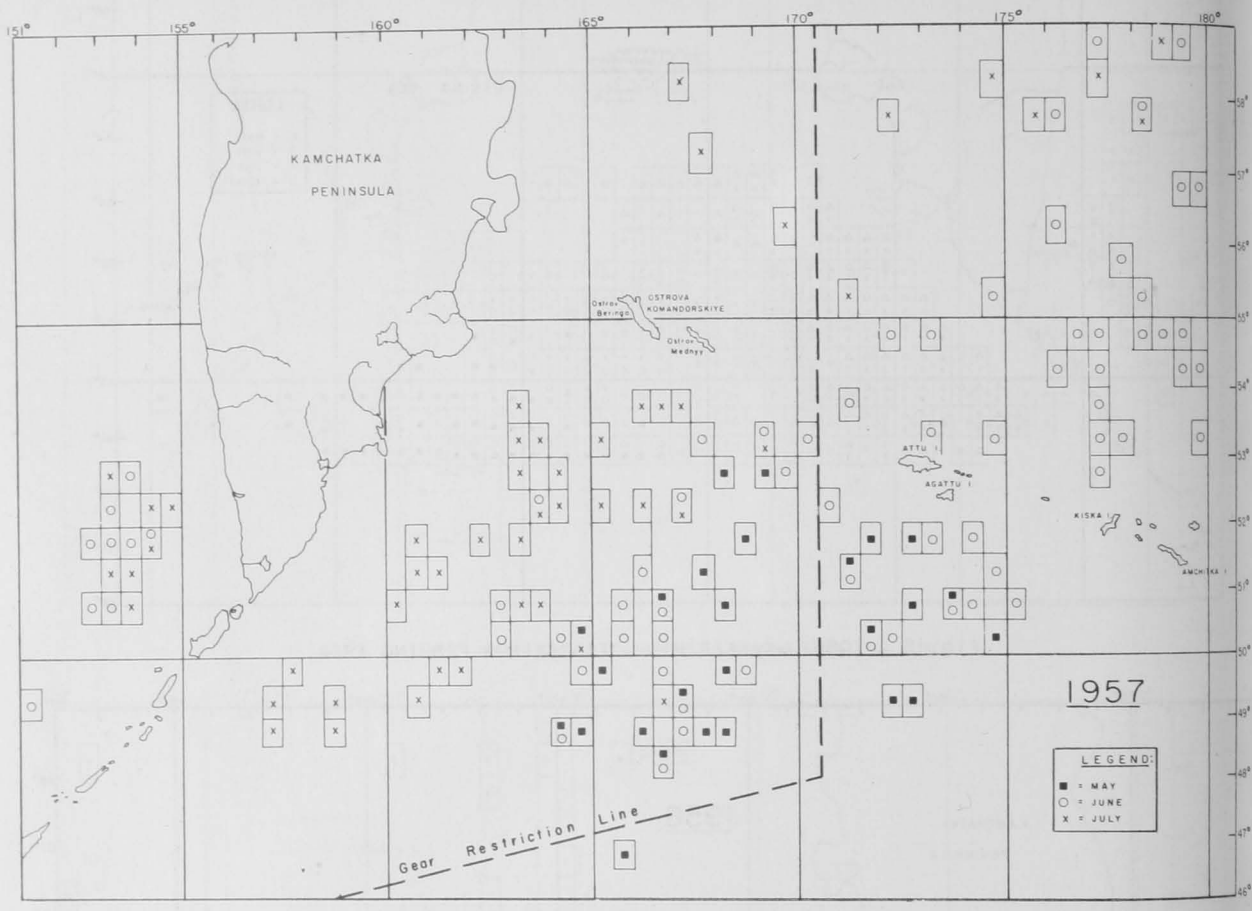


FIG. 7 - 1957 JAPANESE HIGH-SEAS SALMON FISHING AREA.

CATCH DATA

The total salmon catch for the years 1952 through 1957 is shown in figure 8. Included are the numbers of motherships, catcher boats, and tans[3] set, as well as the total salmon catch in metric tons. Table 1 shows the total salmon catch by species, by months, and by years for the Aleutian area.

The red, chum, and pink salmon catches by five-day periods from 1952 to 1956 are shown in figures 9-13.[4] Generally, the greatest red salmon catch occurs from mid-June to late July, chum salmon from mid-June to mid-July, and pink salmon from early July to late July. The catch of silver and king salmon, although not shown, peaks with the catch of pink salmon when the fleets are in the western fishing areas.

Plotted with the catches in figures 11 and 12 are the total tans set for corresponding five-day periods. The catch of the three species is usually directly related to amount of fishing effort. However, in 1954 (fig. 11), with a relatively stable effort during July 11-15, there occurred a sharp decline in both red and chum salmon catch-

3/ UNIT OF GILL NET. ONE TAN IS APPROXIMATELY 175 FEET LONG ALONG THE CORK LINE.
4/ 1957 CATCH DATA BY FIVE-DAY PERIODS OMITTED BECAUSE OF INCOMPLETE DATA.

Table 1 - Total Salmon Catch by Species, by Months, and by Years for the Aleutian Area[1/]

Species and Month	1957	1956	1955	1954	1953	1952
	(Number of Fish)					
Red:						
May	5,874,765	1,520,801	2,483,118	482,493	267,125	165,105
June	10,322,415	4,134,946	3,941,576	961,736	444,011	329,073
July	3,604,711	2,478,728	4,014,727	2,008,038	838,798	244,164
August	-	1,499,071	1,724,527	296,039	14,496	163
Total	19,801,891	9,633,546	12,163,948	3,748,306	1,564,430	738,505
Pink:						
May	330,833	6,192	41,379	4,776	695	508
June	8,320,625	462,219	3,786,191	208,661	167,173	49,528
July	12,402,557	8,925,372	10,174,279	4,103,331	2,658,016	639,802
August	-	2,612,795	2,505,978	1,368,054	329,469	8,171
Total	21,054,015	12,006,578	16,507,827	5,684,822	3,155,353	698,009
Chum:						
May	3,839,355	3,800,081	3,761,149	957,191	261,701	123,985
June	4,177,023	7,807,072	7,807,596	3,640,782	1,385,826	309,088
July	1,213,653	4,017,126	4,715,644	3,795,146	1,020,056	183,629
August	-	1,542,637	2,289,068	629,699	54,097	370
Total	9,230,031	17,166,916	18,573,457	2/ 9,022,818	2,721,680	617,072
Silver:						
May	34	21	9	60	6	-
June	7,726	3,404	1,706	148	139	179
July	331,769	2,768,957	498,309	588,483	257,414	23,369
August	-	985,074	2,683,789	794,086	82,056	648
Total	339,529	3,757,456	3,183,813	1,382,777	339,615	24,196
King:						
May	2,270	1,546	2,072	743	480	22
June	19,129	41,173	6,412	7,550	998	160
July	9,714	65,274	13,047	34,744	6,323	1,166
August	-	28,527	52,553	31,211	413	1
Total	31,113	136,520	74,084	74,248	8,214	1,349
Totals:						
May	10,047,257	5,328,641	6,287,727	1,445,263	530,007	289,620
June	22,846,918	12,448,814	15,543,481	4,818,877	1,998,147	688,028
July	17,562,404	18,255,457	19,416,006	10,529,742	4,780,607	1,092,130
August	-	6,668,104	9,255,915	3,119,089	480,531	9,353
Grand Total	50,456,576	42,701,016	50,503,129	3/19,912,971	7,789,292	2,079,131

1/ INCLUDES SALMON CATCHES FROM OLYUTORSKII AREA.
2/ 400,000 FISH UNACCOUNTED FOR.
3/ 583,640 FISH UNACCOUNTED FOR.

s while the pinks reached a peak. Conversely, during July 21-25, the red and chum salmon catches rose sharply while the pink catch declined considerably. During the following period of July 26-30, a significantly high catch of pinks again occurred while the reds and chums declined sharply.

Figure 14 shows the total catch by species by 5-degree longitudinal intervals for the five years 1952-1956. The catches in 1955 and 1956 between longitudes 150° E. and 155° E. are those of the Okhotsk Sea fleet, which consisted of two motherships for both years. Significant is the increased catch in 1956 of nearly three million silvers and kings between longitudes 165° E. and 175° W. where negligible catches were made in the four earlier years. Table 2 shows the individual and cumulative catch totals by 5-degree longitudinal intervals for years 1952 through 1956.

Figures 15, 16, and 17 compare the red, chum and pink salmon catches for 1955 by the North Pacific and Okhotsk Sea fleets. The increases and decreases in catches of chum and pink salmon in the North Pacific Ocean and Okhotsk Sea coincide in time (figures 16 and 17). Included in figure 15 is the total number of tans set for the respective areas by five-day periods. Even with an increase in effort, the red salm-

Table 2 - Individual and Accumulative[1/] Catch Totals by 5° Longitude Intervals

Longitude (°)	Red	Chum	Pink	Silver & King	Total	Percentage of Catch
	(Number of Fish)					%
			1957			
			Data incomplete.			
			1956			
175 W.-180	764,711	1,199,528	14,002	53,483	2,031,724	5
180 -175 E.	1,860,905	2,230,147	137,026	180,497	4,408,575	10
	(2,625,616)	(3,429,675)	(151,028)	(233,980)	(6,440,299)	
175 -170 E.	2,428,083	5,573,027	410,856	1,281,818	9,693,784	23
	(5,053,699)	(9,002,702)	(561,884)	(1,515,798)	(16,134,083)	
170 -165 E.	784,651	1,332,109	1,038,492	726,973	3,882,225	9
	(5,838,350)	(10,334,811)	(1,600,376)	(2,242,771)	(20,016,308)	
165 -160 E.	1,385,192	1,307,369	3,500,325	1,162,664	7,355,550	18
	(7,223,542)	(11,642,180)	(5,100,701)	(3,405,435)	(27,371,858)	
160 -155 E.	637,885	1,355,719	4,873,866	399,882	7,267,352	17
	(7,861,427)	(12,997,899)	(9,974,567)	(3,805,317)	(34,639,210)	
155 -150 E.	431,278	2,459,152	4,500,908	92,794	7,484,132	18
	(8,292,705)	(15,457,051)	(14,475,475)	(3,898,111)	(42,123,342)	
					2/+ 10,000,000	
					52,123,342	
			1955			
175 W.-180	-	-	-	-	-	-
180 -175 E.	113,729	190,917	2,413	134	307,193	1
175 -170 E.	2,362,292	3,789,543	653,615	2,599	6,808,049	11
	(2,476,021)	(3,980,460)	(656,028)	(2,733)	(7,115,242)	
170 -165 E.	5,609,822	8,383,003	4,648,413	62,368	18,703,606	30
	(8,085,843)	(12,363,463)	(5,304,441)	(65,101)	(25,818,848)	
165 -160 E.	2,635,095	3,879,134	4,061,118	1,653,936	12,230,393	20
	(10,720,938)	(16,242,597)	(9,365,559)	(1,719,037)	(38,049,241)	
160 -155 E.	1,142,785	1,929,017	5,761,271	1,528,845	10,362,918	17
	(11,863,723)	(18,171,614)	(15,126,830)	(3,247,882)	(48,412,159)	
155 -150 E.	915,719	3,224,645	8,340,078	383,416	12,863,858	21
	(12,779,442)	(21,396,259)	(23,466,908)	(3,631,298)	(61,276,017)	
			1954			
175 W.-180	-	-	-	-	-	-
180 -175 E.	131,916	233,294	622	169	366,001	2
175 -170 E.	711,547	2,519,285	68,676	3,925	3,303,433	17
	(843,463)	(2,752,579)	(69,298)	(4,094)	(3,669,434)	
170 -165 E.	1,128,601	1,913,488	169,218	11,998	3,145,905	16
	(1,972,064)	(4,666,067)	(238,516)	(16,092)	(6,815,339)	
165 -160 E.	1,333,810	3,339,999	2,395,810	710,037	7,842,616	39
	(3,305,874)	(8,006,066)	(2,634,326)	(726,129)	(14,657,955)	
160 -155 E.	420,117	918,622	3,058,703	710,757	5,177,201	26
	(3,725,991)	(8,924,688)	(5,693,029)	(1,436,886)	(19,835,156)	
155 -150 E.	-	-	-	-	-	
			1953			
175 W.-180	-	-	-	-	-	-
180 -175 E.	196,209	208,782	545	399	405,935	5
175 -170 E.	359,072	1,201,872	116,577	1,001	1,678,522	22
	(555,281)	(1,410,654)	(117,122)	(1,400)	(2,084,457)	
170 -165 E.	470,236	742,833	475,996	6,306	1,695,371	22
	(1,025,517)	(2,153,487)	(593,118)	(7,706)	(3,779,828)	
165 -160 E.	537,702	567,437	2,562,235	340,123	4,007,497	51
	(1,563,219)	(2,720,924)	(3,155,353)	(347,829)	(7,787,325)	
160 -155 E.	157	119	-	-	276	0
	(1,563,376)	(2,721,043)	-	-	(7,787,601)	
155 -150 E.	556	358	-	-	914	0
	(1,563,932)	(2,721,401)	-	-	(7,788,515)	
			1952			
175 W.-180	-	-	-	-	-	-
180 -175 E.	366,177	230,373	9,597	79	606,226	29
175 -170 E.	162,209	225,296	54,355	475	442,335	21
	(528,386)	(455,669)	(63,952)	(554)	(1,048,561)	
170 -165 E.	106,796	43,698	68,043	762	219,299	11
	(635,182)	(499,367)	(131,995)	(1,316)	(1,267,860)	
165 -160 E.	103,323	117,705	566,014	24,229	811,271	39
	(738,505)	(617,072)	(698,009)	(25,545)	(2,079,131)	
160 -155 E.	-	-	-	-	-	-
155 -150 E.	-	-	-	-	-	-

1/CUMULATIVE TOTALS IN PARENTHESES.

2/PLUS TEN MILLION MORE FISH UNACCOUNTED FOR.

on catch in the North Pacific declined in mid-July. However, the Okhotsk red salmon catch, with a relatively constant effort, began to increase significantly in mid-July when the North Pacific catch declined.

	MOTHERSHIP	CATCHERS	NO. GILL NETS SET	NO. OF FISH	CATCH IN METRIC TONS
1952	3	57	467,598	2,079,131	3,629
1953	3	105	1,274,726	7,789,292	14,515
1954	7	205	3,207,444	20,496,611	36,287
1955	14	406	8,990,000	64,041,000	115,000
1956	16	506	9,829,871	52,066,050	94,000
1957	16	461	Not received to date	56,430,576*	99,984

*ESTIMATED.

FIG. 8 - JAPANESE MOTHERSHIP SALMON FISHERY.

RED SALMON: Significant is the unprecedented catch of 10,322,000 reds in June of 1957, of which approximately 5,000,000 fish were caught in the ten-day period from June 11 to 20 in the northern Aleutians in an area bounded roughly by longitudes 175° E. and 180° and latitudes 53° N. and 57° N. The total red salmon catch of 19,802,000 fish in 1957 was almost twice that of the next high catch of 12,164,000 reds in 1955.

CHUM SALMON: The greatest chum salmon catches occurred in 1955 and 1956 when 18,573,000 and 17,167,000 fish were caught, respectively. The largest chum catch in any year generally occurred during the month of June and represents almost one-half of the total chum catch of that year.

PINK SALMON: In 1957 the pink salmon catch reached a high of 21,054,000 fish, 4,500,000 more than the next high of 16,508,000 in 1955. The catch of 8,321,000 pinks in June of 1957 is significant in that the catches of the corresponding month for the five previous years were considerably less in proportion to their total catches.

SILVER AND KING SALMON: The catch of both silver and king salmon from 1952 through 1957 exhibits a marked increase from the month of July when the fleets were in the more westerly fishing areas. The unusually large catch of 2,769,000 silvers and 65,274 kings in July 1956 is discussed in a section dealing with salmon catches by 5-degree longitudinal intervals.

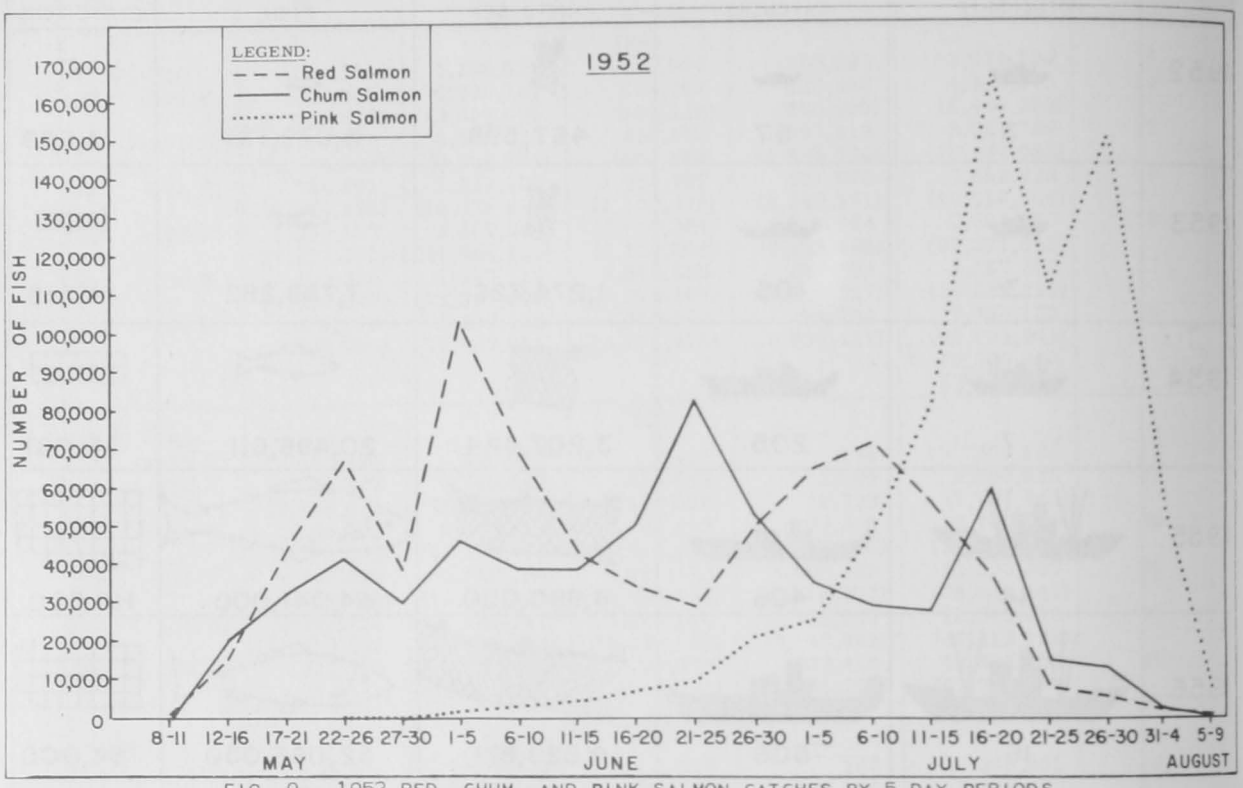


FIG. 9 - 1952 RED, CHUM, AND PINK SALMON CATCHES BY 5-DAY PERIODS.

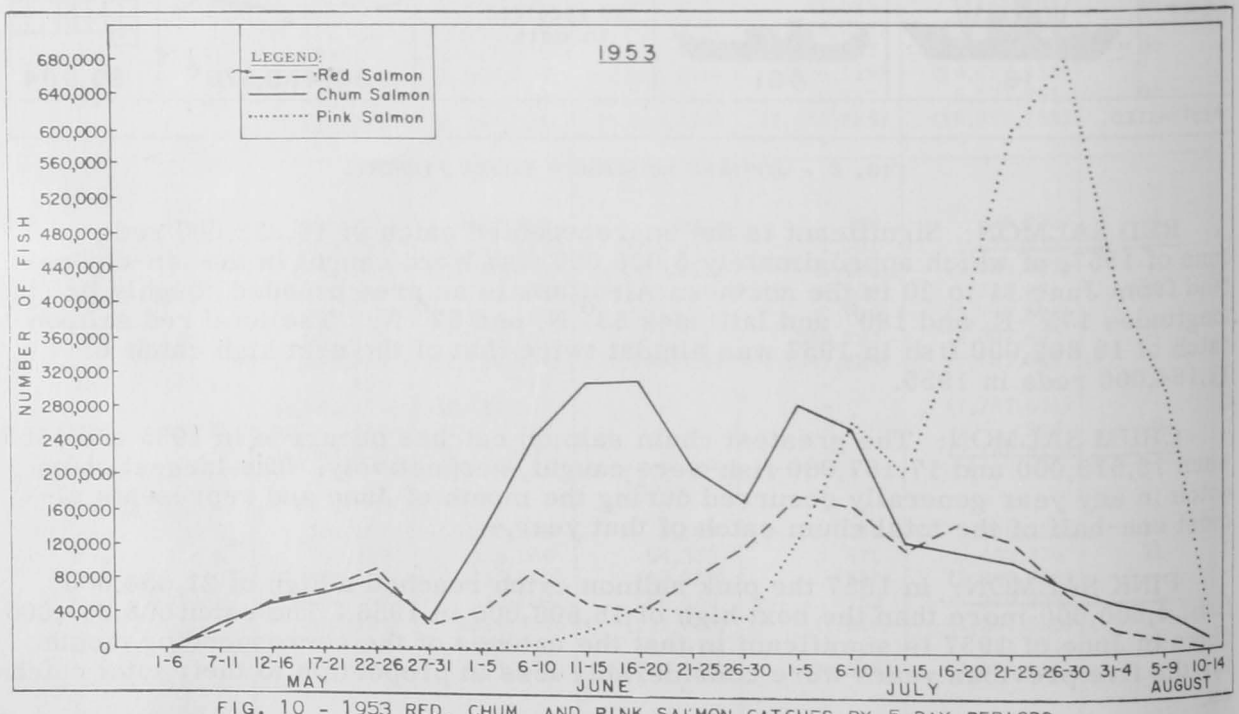


FIG. 10 - 1953 RED, CHUM, AND PINK SALMON CATCHES BY 5-DAY PERIODS.

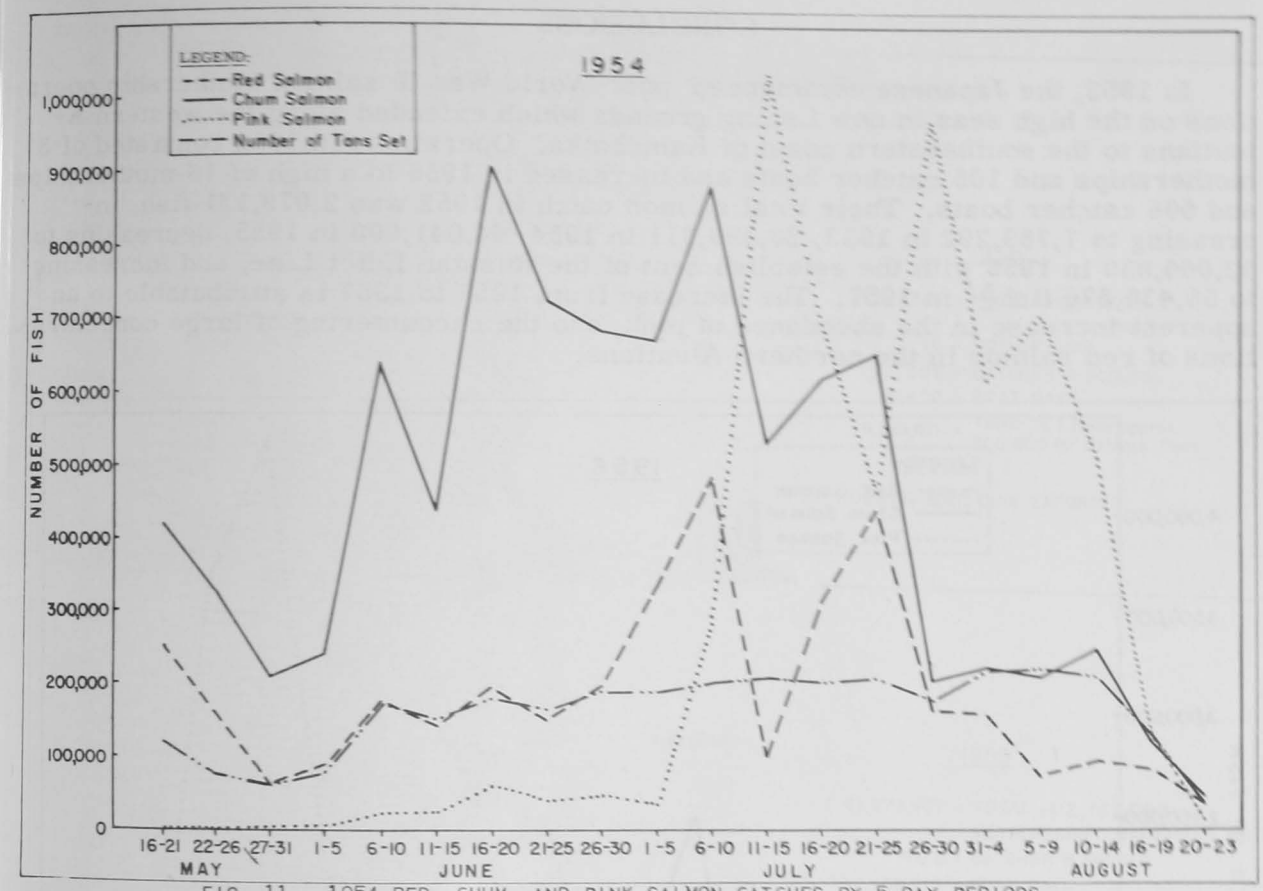


FIG. 11 - 1954 RED, CHUM, AND PINK SALMON CATCHES BY 5-DAY PERIODS.

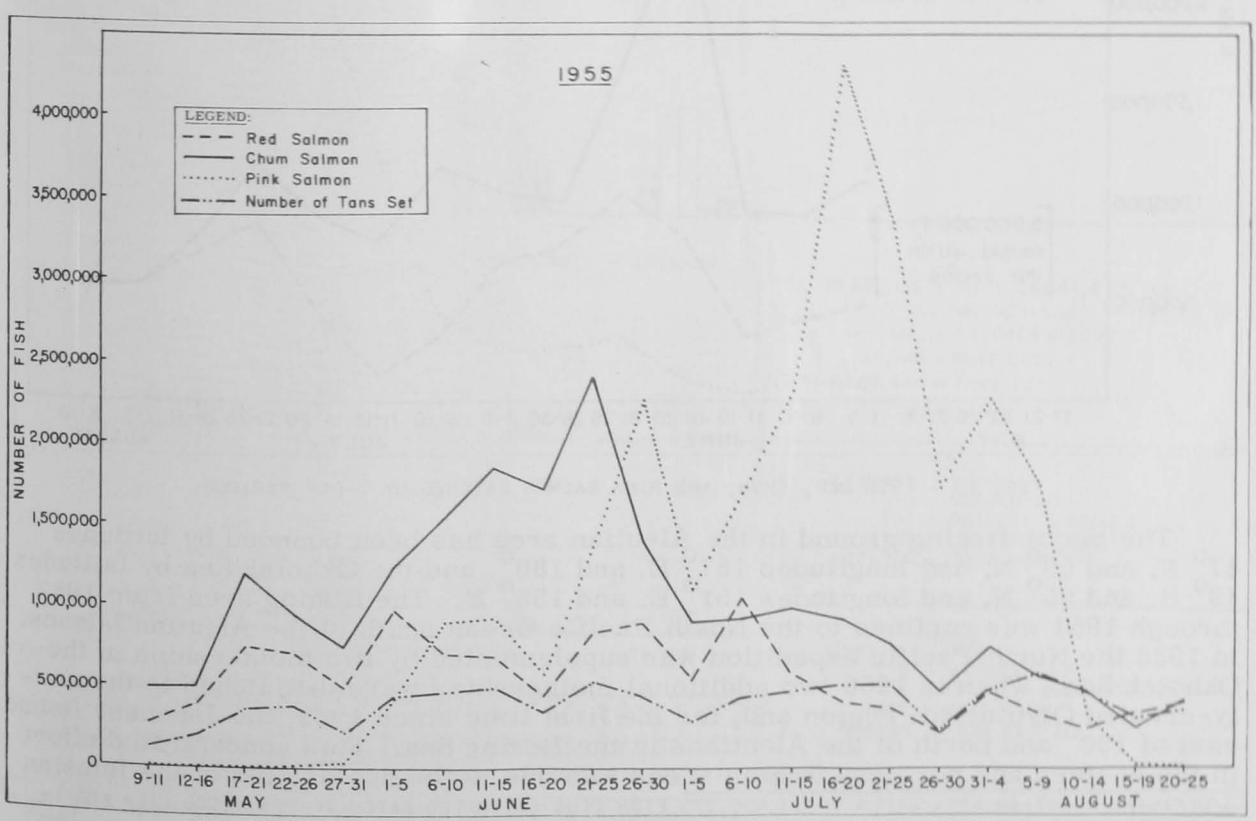


FIG. 12 - 1955 RED, CHUM, AND PINK SALMON CATCHES BY 5-DAY PERIODS.

CONCLUSIONS

In 1952, the Japanese commenced post-World War II salmon mothership operations on the high seas in new fishing grounds which extended along the western Aleutians to the southeastern coast of Kamchatka. Operations in 1952 consisted of 3 motherships and 105 catcher boats and increased in 1956 to a high of 16 motherships and 506 catcher boats. Their total salmon catch in 1952 was 2,079,131 fish, increasing to 7,789,292 in 1953, 20,496,611 in 1954, 64,041,000 in 1955, decreasing to 52,066,050 in 1956 with the establishment of the Russian Edict Line, and increasing to 56,430,576 fish[5/] in 1957. The increase from 1956 to 1957 is attributable to an apparent increase in the abundance of pink, and the encountering of large concentrations of red salmon in the northern Aleutians.

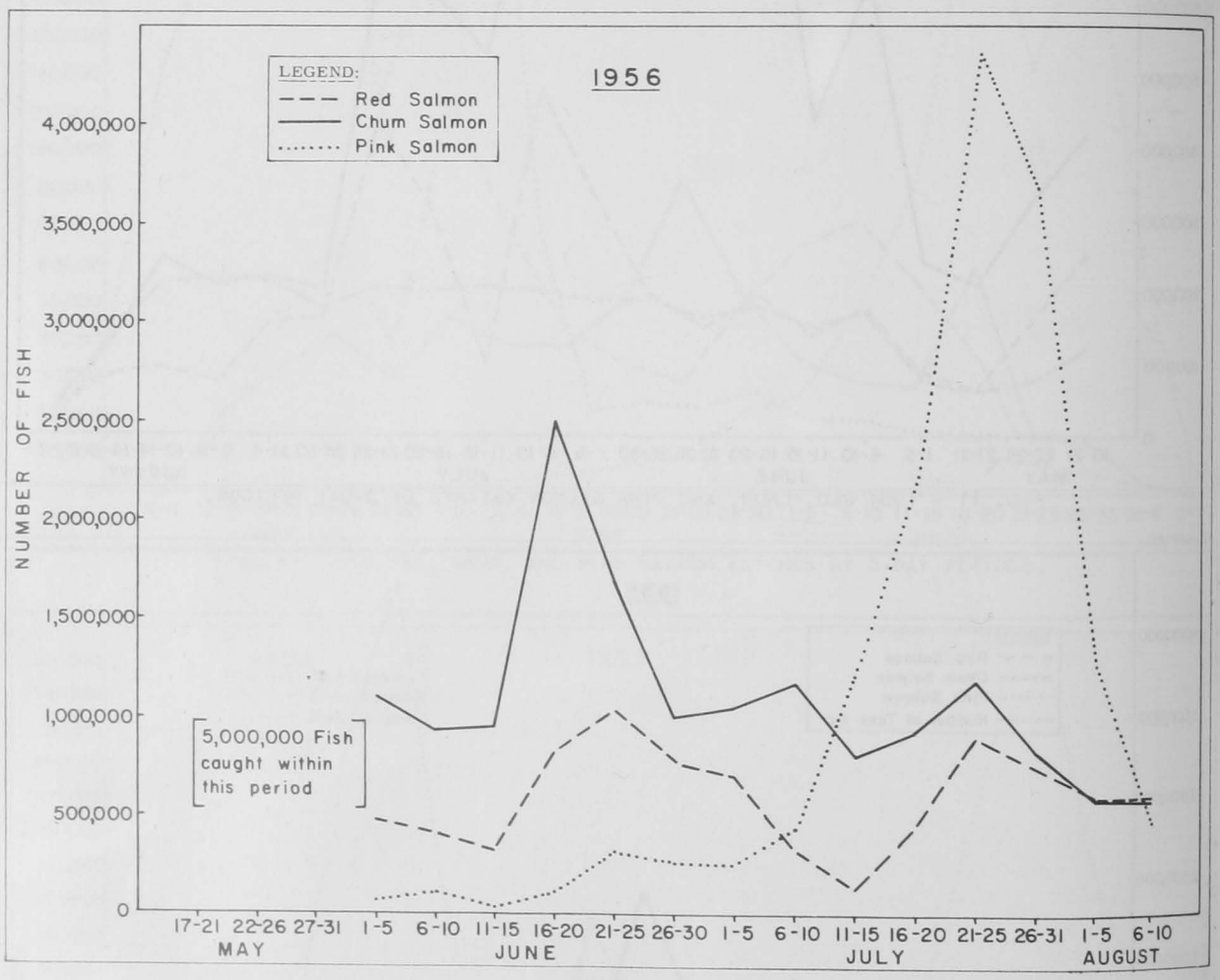


FIG. 13 - 1956 RED, CHUM, AND PINK SALMON CATCHES BY 5-DAY PERIODS.

The major fishing ground in the Aleutian area has been bounded by latitudes 47° N. and 59° N. and longitudes 157° E. and 180°, and the Okhotsk Sea by latitudes 49° N. and 55° N. and longitudes 151° E. and 155° E. The fishing area from 1952 through 1954 was confined to the North Pacific Ocean south of the Aleutian Islands. In 1955 the North Pacific expedition was supplemented by two motherships in the Okhotsk Sea. Then in 1956 two additional motherships were dispatched to the newly-created Olyutorskii region and, for the first time since 1952, the Japanese fished east of 180° and north of the Aleutians in the Bering Sea. This concentrated effort in the eastern and northern fishing areas was due to the declaration of the Russian

5/OFFICIAL ALEUTIAN AREA CATCH OF 50,456,576 FISH PLUS ESTIMATED CATCH OF 5,974,000 FISH FOR THE OKHOTSK SEA.

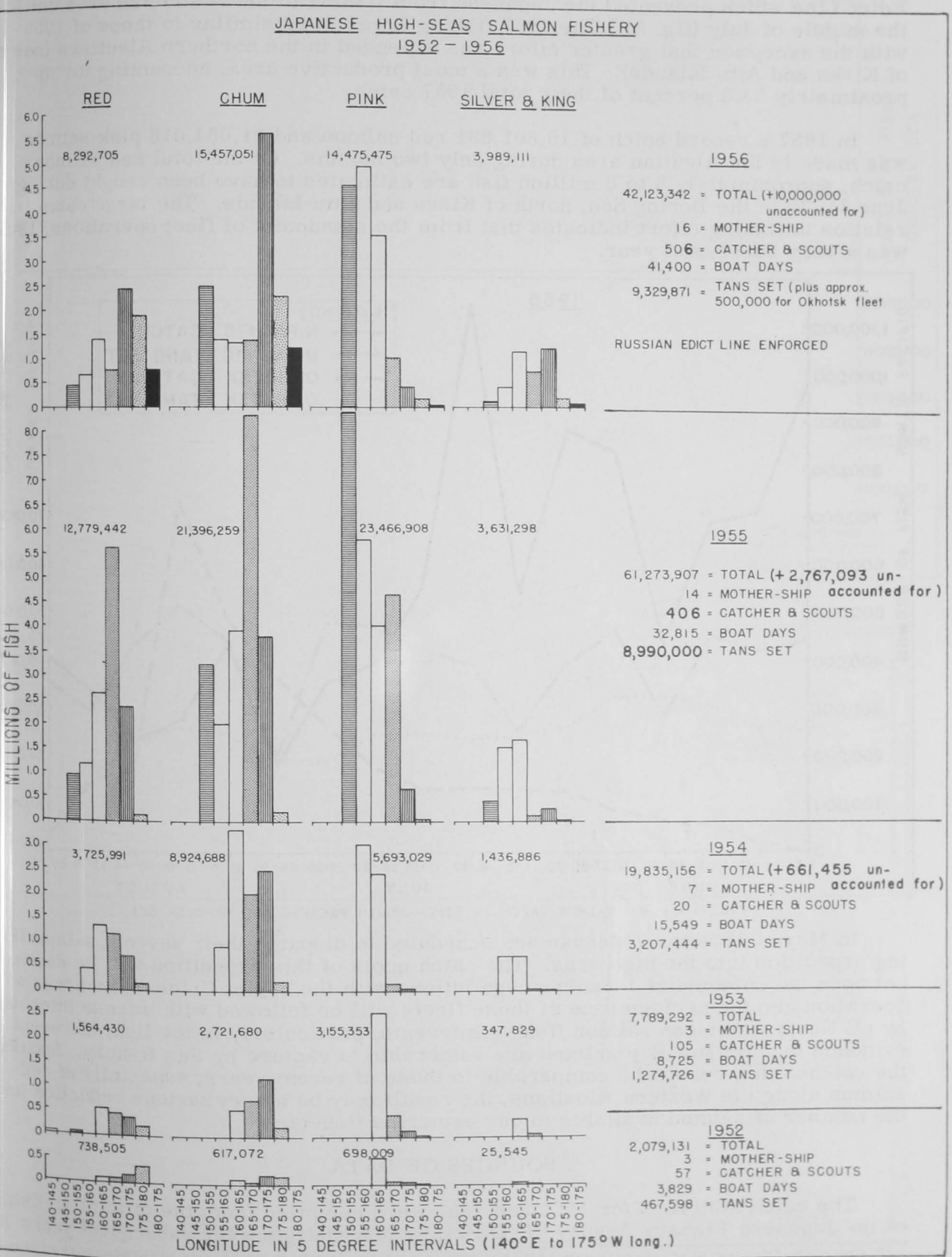


FIG. 14 - JAPANESE HIGH-SEAS SALMON CATCHES BY 5-DEGREE LONGITUDINAL INTERVALS FOR YEARS 1952 TO 1956.

Edict Line which prevented the Japanese from fishing in the restricted area until the middle of July (fig. 6). The 1957 fishing areas were similar to those of 1956 with the exception that greater effort was expended in the northern Aleutians (north of Kiska and Attu Islands). This was a most productive area, accounting for approximately 33.8 percent of their total 1957 catch.

In 1957 a record catch of 19,801,891 red salmon and 21,054,015 pink salmon was made in the Aleutian area during only two months. Of the total red salmon catch, approximately 5 to 8 million fish are estimated to have been caught during June 11-30 in the Bering Sea, north of Kiska and Attu Islands. The large catch in relation to fishing effort indicates that from the standpoint of fleet operations, 1957 was a very successful year.

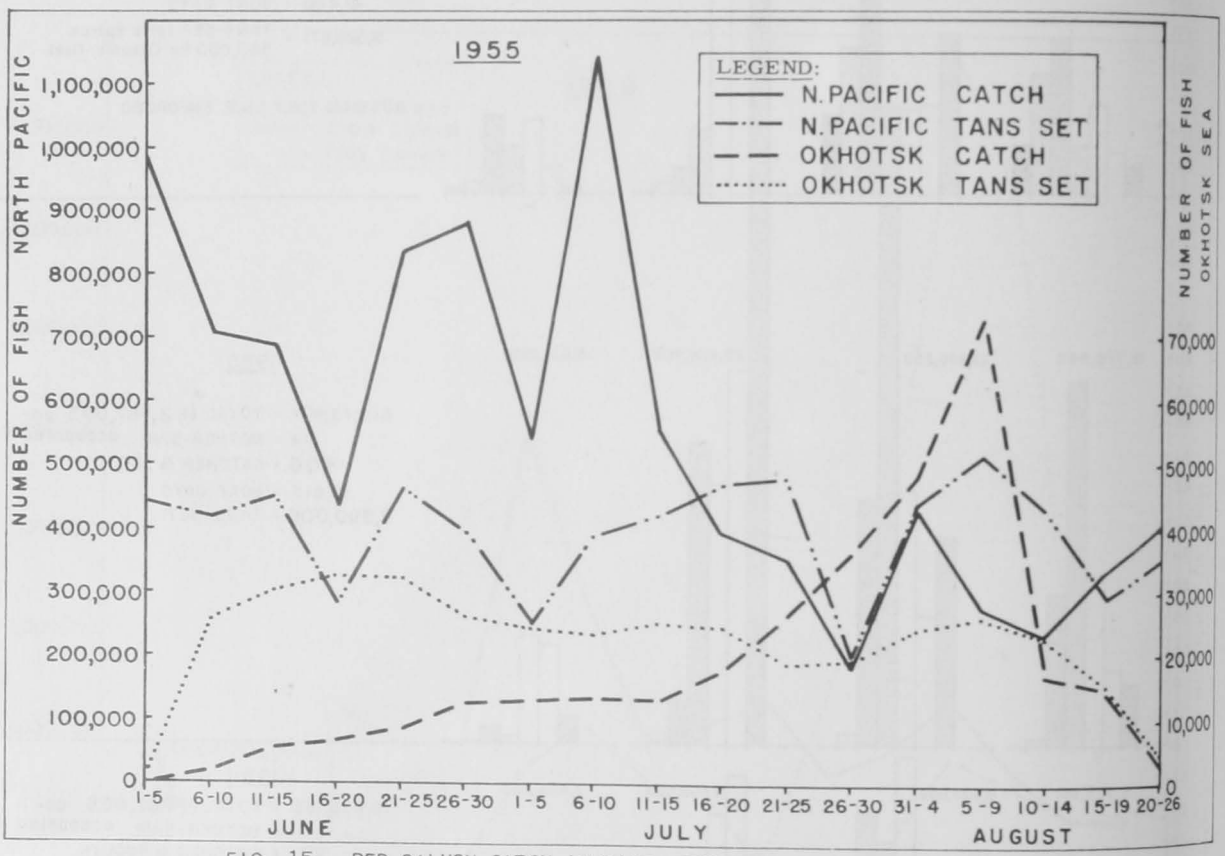


FIG. 15 - RED SALMON CATCH IN TIME--NORTH PACIFIC AND OKHOTSK SEA.

In May of 1958 the Japanese are scheduled to dispatch their seventh salmon fishing expedition into the high seas. The catch quota of this expedition will be dependent upon the outcome of Japanese negotiations with the Soviet Union. The areas of operation and the performance of these fleets will be followed with intense interest by all North American salmon fishing interests, particularly in the light of recent evidence that Bristol Bay salmon are vulnerable to capture by this fishery. Should the catches this season be comparable to those of recent years, especially of red salmon along the Western Aleutians, the result may be a very serious reduction in the number of salmon available to our estuarine fisheries.

SOURCES OF DATA

The catch statistics for 1952 and 1953 were compiled from the official statistics of the Japanese Fishery Agency.6/ Official catch statistics for subsequent years are

6/REPORTS ON THE JAPANESE MOTHERSHIP-TYPE SALMON FISHERIES (1952 & 1953) AND MOTHERSHIP-TYPE CRAB FISHERIES (1953). JAPANESE FISHERY AGENCY, DECEMBER 1953.

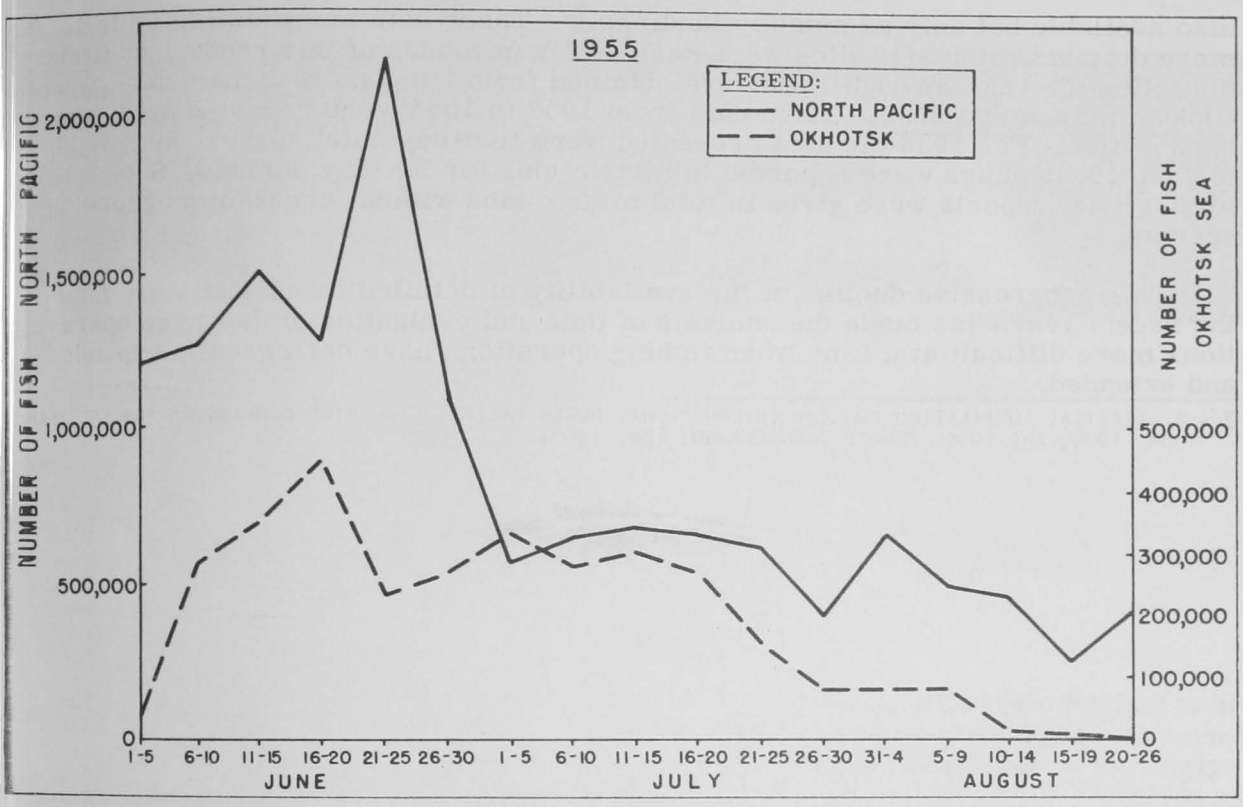


FIG. 16 - CHUM SALMON CATCH IN TIME--NORTH PACIFIC AND OKHOTSK SEA.

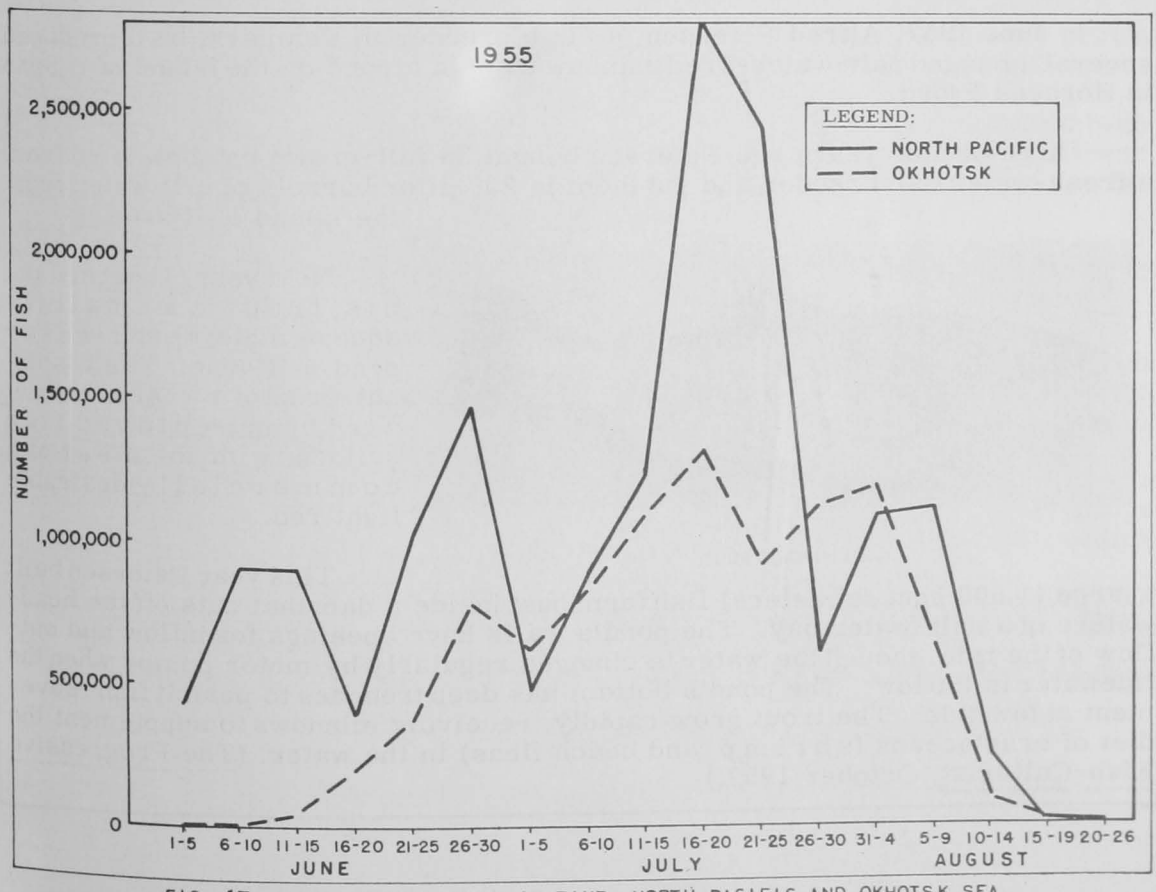


FIG. 17 - PINK SALMON CATCH IN TIME--NORTH PACIFIC AND OKHOTSK SEA.

also available but only as monthly landings.7/ These data are shown in table 1. As more detailed catch statistics were desired for purposes of this report, unofficial statistics for 1954 through 1957 were obtained from a Japanese fisheries newspaper (Hokkai Suisan Shimbun). Catch data from 1952 to 1955 were reported daily in numbers of fish. For 1956 the data presented were five-day catch totals. In 1957, up to June 10, landings were reported in metric tons for ten-day periods. Subsequent to that date, reports were given in total metric tons without breakdown according to species.

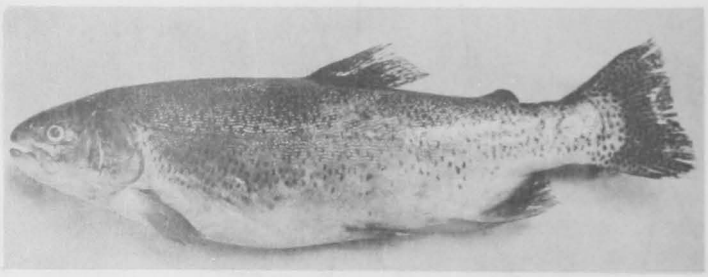
This progressive decline of the availability of detailed catch statistics during the recent years has made the analysis of data and evaluation of Japanese operations more difficult at a time when fishing operations have been greatly expanded and extended.

7/ A STATISTICAL COMPILATION FOR THE INTERNATIONAL NORTH PACIFIC FISHERIES COMMISSION FOR THE YEARS 1954, 1955, AND 1956. INPFC DOCUMENT NO. 124, 1957.

RAINBOW TROUT BRED IN SALT WATER

In June 1957, Alfred Petersen, a fish breeder in Denmark, had produced several thousand salt-water-bred rainbow trout in a pond on the island of Hjarno in Horsens Fjord.

Three or four years ago Petersen bought 35 full-grown rainbow trout from a fresh-water fish breeder and put them in 200-liter barrels of salt water from the island of Hjarno.



RAINBOW TROUT

Next year, Petersen put his trout in a small (20 square meters) salt-water pond on Hjarno. The resultant crop of rainbow trout were bright-colored like salmon, with the meat of a commercially desirable light red.

This year Petersen built a large (1,600 square meters) fish farm just inside a dam that cuts off the headwaters of a salt-water bay. The pond's walls have openings for inflow and outflow of the tide, though the water is changed regularly by motor pumps when the tidewater is too low. The pond's bottom has deep trenches to permit fish movement at low tide. The trout grow rapidly, receiving minnows to supplement the diet of crustaceans (shrimp and beach fleas) in the water. (The Progressive Fish-Culturist, October 1957.)