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CATCH AND EFFORT OF THE JAPANESE MOTHERSHIP
SALMON FISHERY AND ESTIMATED INTERCEPTIONS OF
WESTERN ALASKA SALMON IN 1980

by

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The Japanese mothership salmon fishery is authorized to gillnet for salmon according to specific provisions of the International Convention for the High Seas Fisheries of the North Pacific Ocean (INPFC). The convention, originally negotiated in 1952, was renegotiated by the U.S., Canada, and Japan in 1977-78 after passage of the U.S. 200 mile law (the Magnuson Fishery Conservation and Management Act). The new convention authorizes Japanese mothership gillnetting for salmon inside the U.S. Fishery Conservation Zone (FCZ) in return for limitations on the mothership fishing effort beyond the U.S. 200-mile zone (Figure 1). A primary purpose of the agreement is to allow Japan the opportunity to continue their traditional harvest of salmon of Asian origin, primarily chum salmon, while minimizing the interceptions of North American salmon, especially Bristol Bay sockeye salmon.

Four Japanese motherships and 172 catcher boats fished 3.1 million tans of gillnet in 1980, slightly more than either of the previous two years. Catches of the 1980 Japanese mothership salmon fishery as provided by the Japan Fisheries Agency were allocated by general area (Table 1). The total sockeye salmon and chum salmon catches were of the same general magnitude as the 1978 and 1979 catches, whereas the 1980 pink salmon catch was the lowest in history and only 17% of the 1979 and 30% of the 1978 pink salmon catches. The 1980 catch of 704,000 chinook salmon, on the other hand, represents a 460% and 580% increase over the respective 1979 and 1978 chinook salmon catches and is the largest total chinook salmon catch since the initiation of the convention in 1953. The total catch of salmon by the mothership fishery in 1980 was less than either the 1978 or 1979 catch due primarily to the poor catch of pink salmon.

United States scientists have, since 1956, estimated the interceptions of North American salmon by the Japanese mothership salmon fishery. Because the negotiated agreement eliminated fishing in the area east of 175° E. longitude and south of 56° N. latitude, virtually all North American salmon intercepted are of western Alaska origin. The estimates are derived from several different types of information: age-composition and tag-recovery data for sockeye salmon; tag-recovery data for pink, chum, and coho salmon; and scale patterns for chinook salmon.

The Japanese mothership fleet intercepted 864,000 western Alaska (primarily Bristol Bay) sockeye salmon during 1980 (Table 2). The number of sockeye salmon intercepted was greater in 1980 than either 1978 or 1979 but below the 20-year (1956-77) average of 2.4 million fish and far below the average catch of 4 million fish during the previous Bristol Bay peak cycle years (1960, 1965, 1970, 1975). On the average, the 1978-80 level of sockeye salmon interception represents about a 76% reduction in Japanese mothership interceptions of Bristol Bay sockeye salmon by the Japanese mothership salmon fishery (Table 3).

Perhaps the best example of the effect of removing the Japanese mothership fleet from the area east of 175° E. longitude and south of 56° N

latitude is the resulting reduction in the catch of maturing Bristol Bay sockeye salmon. The average interception of maturing Bristol Bay sockeye salmon declined by 94% from 1956-77 to 1978-80 (Table 3), whereas the interception of immature sockeye salmon was of the same general magnitude before and after the renegotiated treaty. Thus, the reduction in total interceptions of western Alaska sockeye salmon is primarily due to the reduction in interceptions of maturing sockeye salmon.

Another benefit to U.S. salmon fisheries of the revised convention is the dramatic reduction in the interceptions of North American chum salmon. Interceptions of chum salmon averaged 189,000 fish during 1975-77 but only 30,000 fish during 1978-80 (Table 2). We have no direct evidence that North American pink salmon or coho salmon are found in the present mothership fishing area.

The percentage of western Alaska chinook salmon in the mothership catches is estimated from scale characteristics. Because scale samples for making such estimates are frequently small within any one year, the data have been pooled over several years (1966-72) to estimate the percentages of western Alaska chinook salmon in various 2° X 5° statistical areas by month (Dahlberg 1980). The averages of the monthly percentages provide estimates of the annual interceptions of western Alaska chinook salmon. This method has been used by the U.S. National Section for estimating chinook salmon interceptions since 1956. According to the previously described method, 388,155 chinook salmon from a total catch of 703,798 chinook salmon were estimated to be of western Alaska origin.

In 1980, the second largest interception of western Alaska chinook salmon since 1956, exceeded only by the 1969 interception of 435,000 chinook salmon occurred. The number of western Alaska chinook salmon intercepted in 1980 represent nearly a 500% increase over the 1979 interception level and nearly a 1,200% increase over the 1978 level. Chinook salmon intercepted by the mothership fleet in 1980 averaged six pounds and were in their second and third years of ocean life. The single greatest area of interception was the central Bering Sea north of the U.S. FCZ where 74% of the total western Alaska chinook salmon interceptions occurred (Figure 2). Within the central Bering Sea, 76% of the interceptions of western Alaska chinook salmon were taken east of 180° longitude. The INPFC 2° X 5° statistical areas were ranked from the largest to the smallest on the basis of total interceptions of western Alaska chinook salmon between 1956 and 1979 (Figure 3). The central Bering Sea fishing areas both east and west of 180° longitude have historically produced the greatest interceptions of western Alaska chinook salmon. The distribution and magnitude of the interceptions of western Alaska chinook salmon east and west of 180° longitude varied drastically during the period 1978-80 (Figure 4). The historical fishing effort, fleet days allowed under the revised protocol, and proportion of interceptions of western Alaska chinook salmon are all greater east of 180° than west of that longitude in the Bering Sea (Figure 5). The greatest amount of effort and the greatest number of interceptions of western Alaska chinook salmon occurred east of 180° longitude in the Bering Sea in 1980.

The number of tans fished in 1980 increased by 60% from 1979 and by over 240% from 1978. However, the level of effort in 1980 represents only 68% of the tans fished in 1969 when a record 435,000 western Alaska chinook salmon were intercepted. The trend in fishing effort in the central Bering Sea during 1956-80 has varied from zero in 1958 and 1962 to over 1½ million tans in 1972 (Figure 6). Although fishing effort in the central Bering Sea during 1980 increased by 60% from 1979, the total catch of chinook salmon of

all origins increased by over 500% (Figure 7). Thus, catch per unit of effort (CPUE) in 1980 was a record 768 chinook salmon per thousand tans, nearly 4 times greater than the CPUE in 1979 and nearly triple the previous high observed in 1969 (Figure 8). The record high CPUE observed in 1980 strongly suggests a very large number of chinook salmon were available to the mothership fleet in the central Bering Sea during 1980 (Figure 9).

Table 1.--Catch of salmon by the Japanese Mothership Salmon Fishery in 1980.
Source: Fisheries Agency of Japan.

Area	CATCH IN THOUSANDS OF FISH					Total
	Sockeye	Chum	Pink	Coho	Chinook	
All Areas	2,412	3,098	561	656	704	7,431
Inside FCZ	1,935	1,863	338	528	265	5,029
Outside FCZ	477	1,235	223	28	439	2,402
South of FCZ	391	414	58	28	16	907
Bering Sea	86	821	165	0	423	1,495
West of 180°	40	441	51	0	205	736
East of 180°	46	380	114	0	218	758

Table 2.--Interceptions (in thousands of fish) of western Alaska salmon by the Japanese Mothership Salmon Fishery, 1975-80.

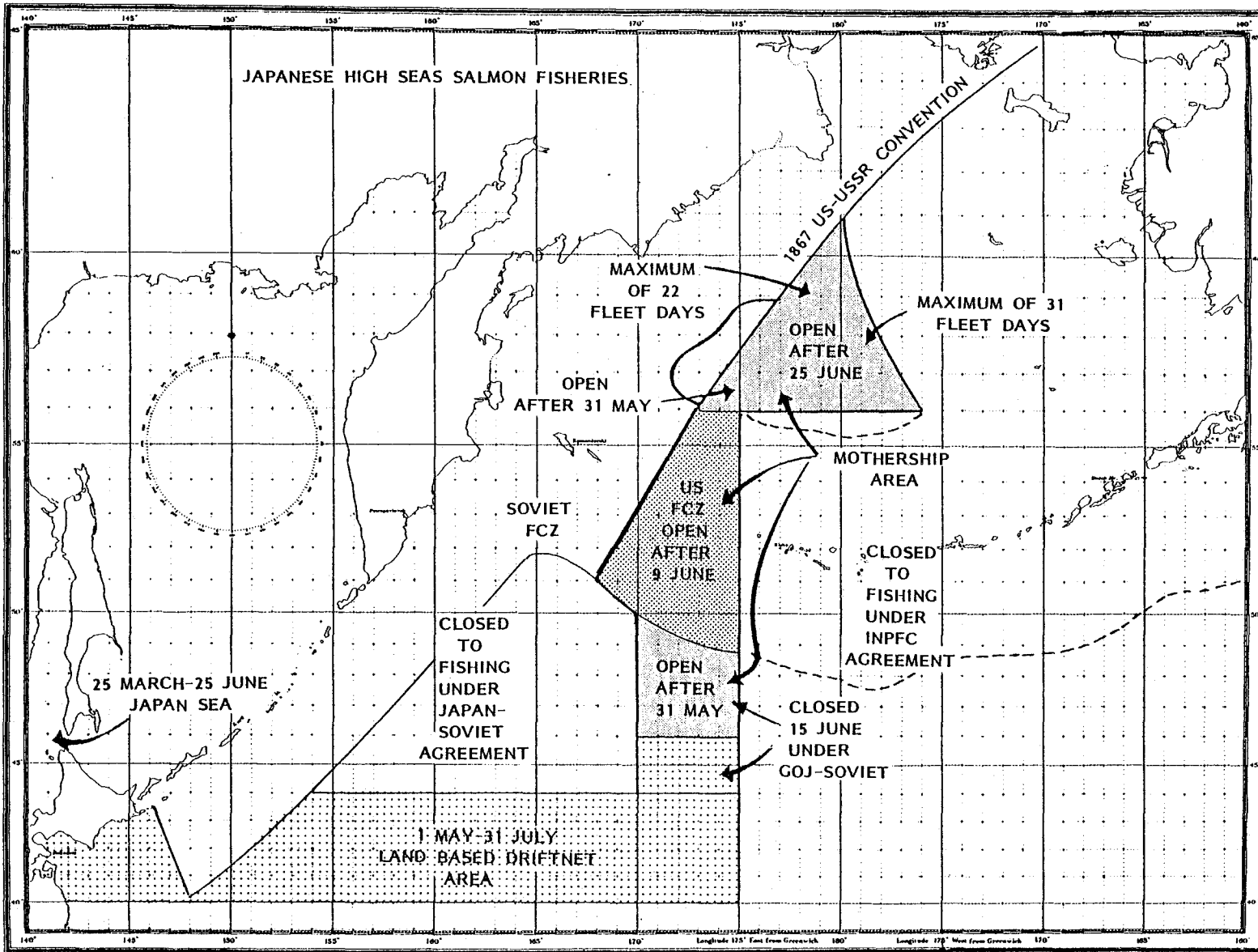
Year	Sockeye	Chum	Pink	Coho	Chinook	Total
1975	864	126	4	4	109	1,107
1976	1,001—	218	224	32	168	1,643
1977	868	223	2	0	65	1,158
1978	360	8	*	*	31	399
1979	478	43	*	*	65	586
1980	861	39	*	*	388	1,288

* Indicates that species was assumed not present in the mothership fishing area.

Table 3.--Estimated catch (thousands of fish) of maturing and immature age .2 sockeye salmon of Bristol Bay origin by the Japanese Salmon Mothership Fishery, 1956-80.

<u>CATCH BY MATURITY CATEGORY</u>			
<u>Year</u>	<u>Maturing</u>	<u>Immature</u>	<u>Total</u>
1956	2,431	905	3,336
1957	6,444	11	6,455
1958	366	33	399
1959	565	87	652
1960	3,640	310	3,950
1961	5,819	127	5,946
1962	833	72	905
1963	929	60	989
1964	254	843	1,097
1965	6,100	404	6,504
1966	1,531	56	1,587
1967	866	21	887
1968	864	791	1,655
1969	1,240	517	1,757
1970	3,451	1,207	4,658
1971	842	592	1,434
1972	710	214	924
1973	625	259	884
1974	251	708	959
1975	645	222	867
1976	779	228	1,007
1977	540	328	868
Total	39,725	7,995	47,720
Average	1,986	400	2,386
1978	124	236	360
1979	68	410	478
1980	180	681	861
Total	332	1,327	1,699
Average	111	442	566

Figure 1.--Operating areas of the high seas salmon fisheries of Japan.



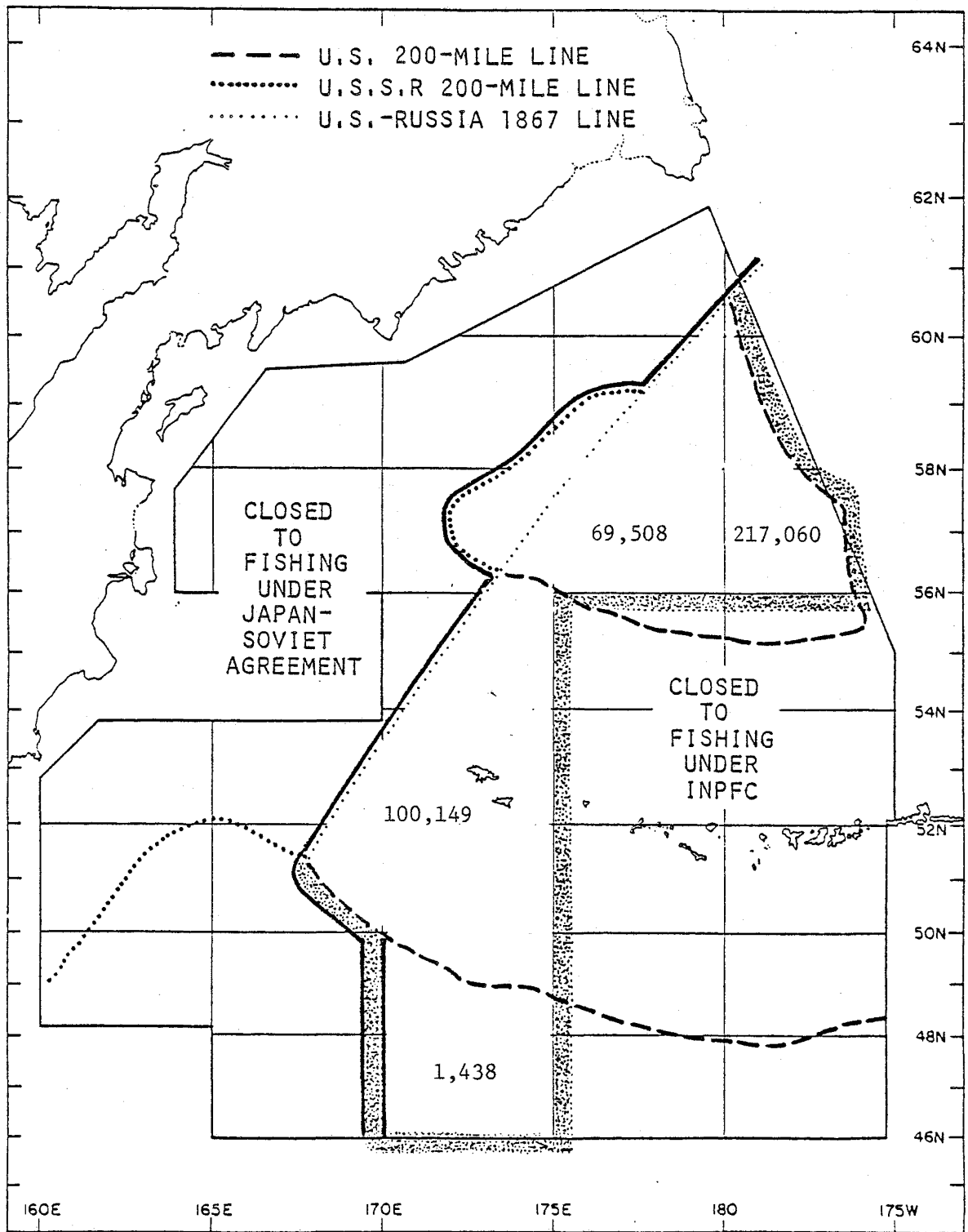


Figure 2.--Estimated 1980 Japanese mothership interceptions of western Alaska chinook salmon.

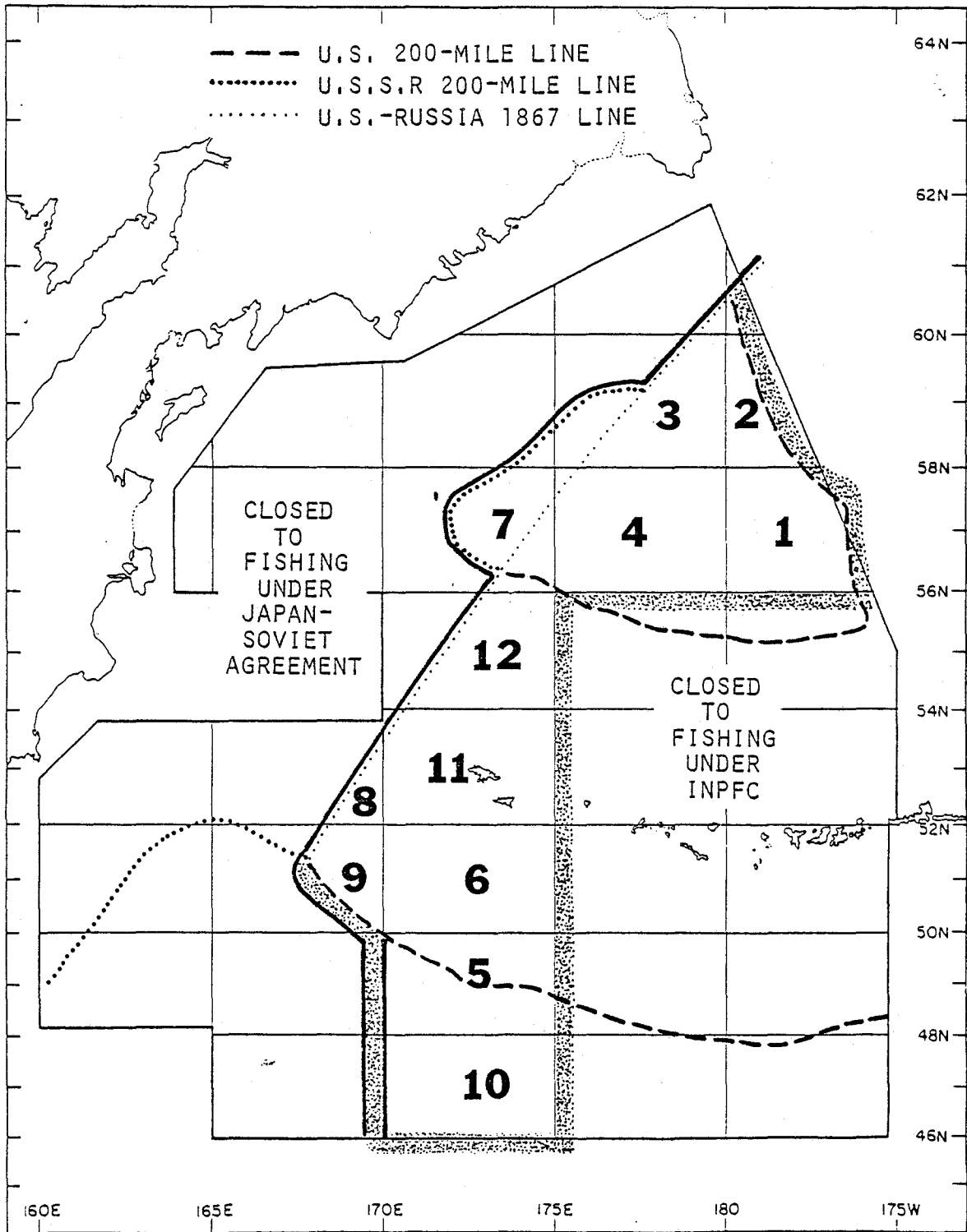


Figure 3.--Post-1977 Japanese mothership salmon fishing area showing the rank order, from largest to smallest, of interceptions of western Alaska chinook salmon by 2° X 5° statistical area.

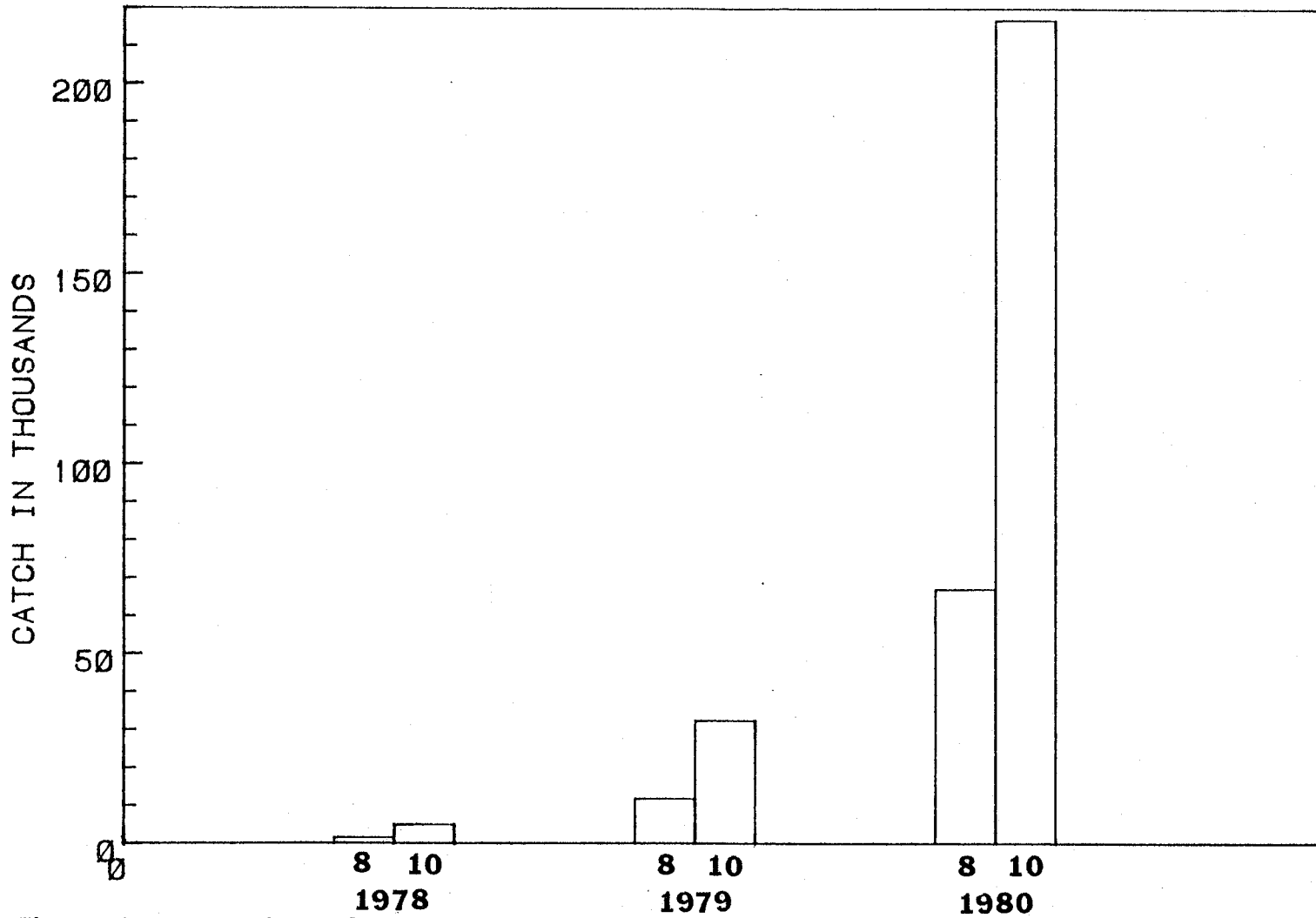


Figure 4.--Comparison of estimated interceptions of western Alaska chinook salmon east (10) and west (8) of 180° longitude in the Bering Sea.

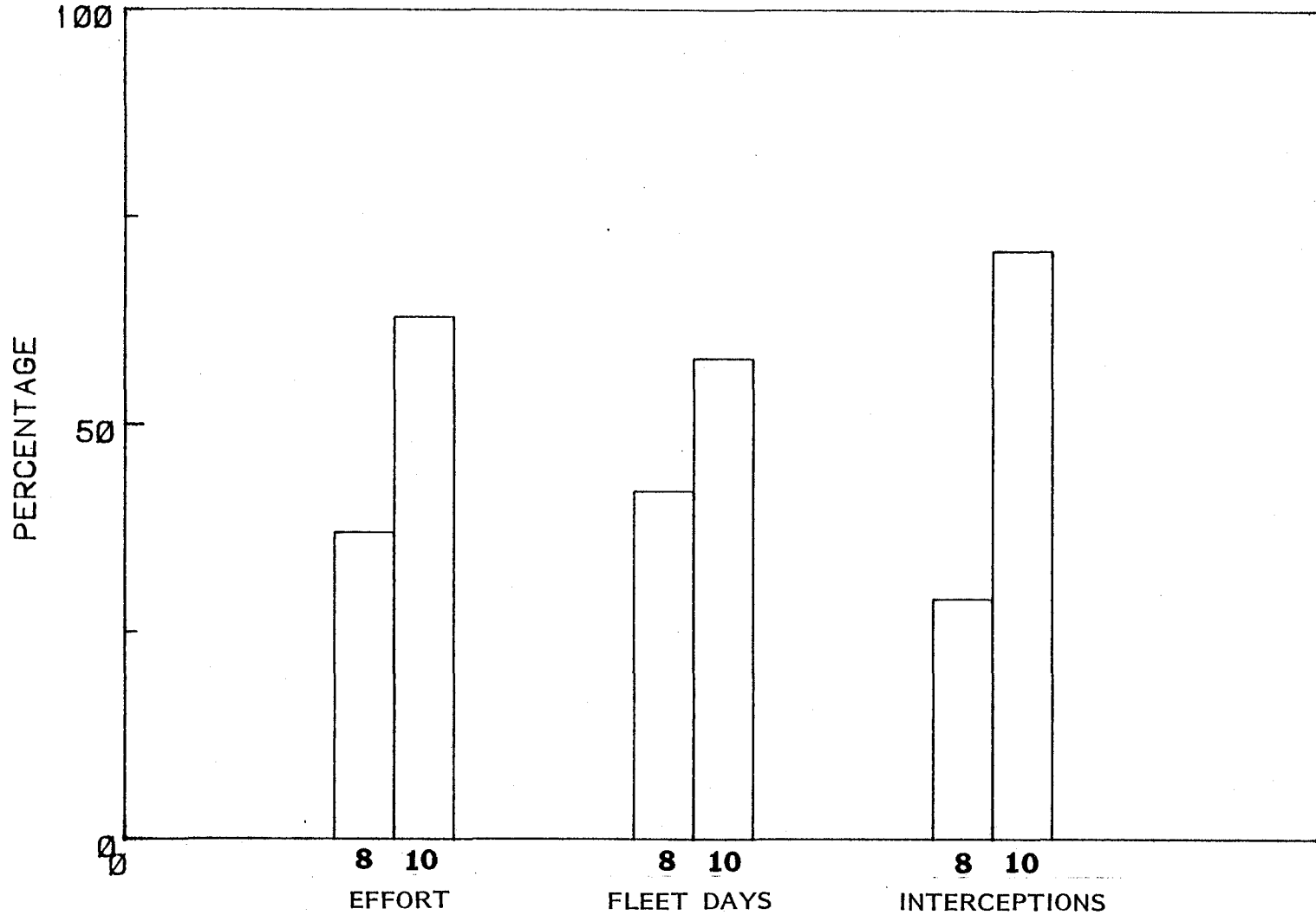


Figure 5.--Comparison of historical effort, allowable fleet days of fishing, and estimated interceptions of western Alaska chinook salmon east (10) and west (8) of 180° longitude in the Bering Sea.

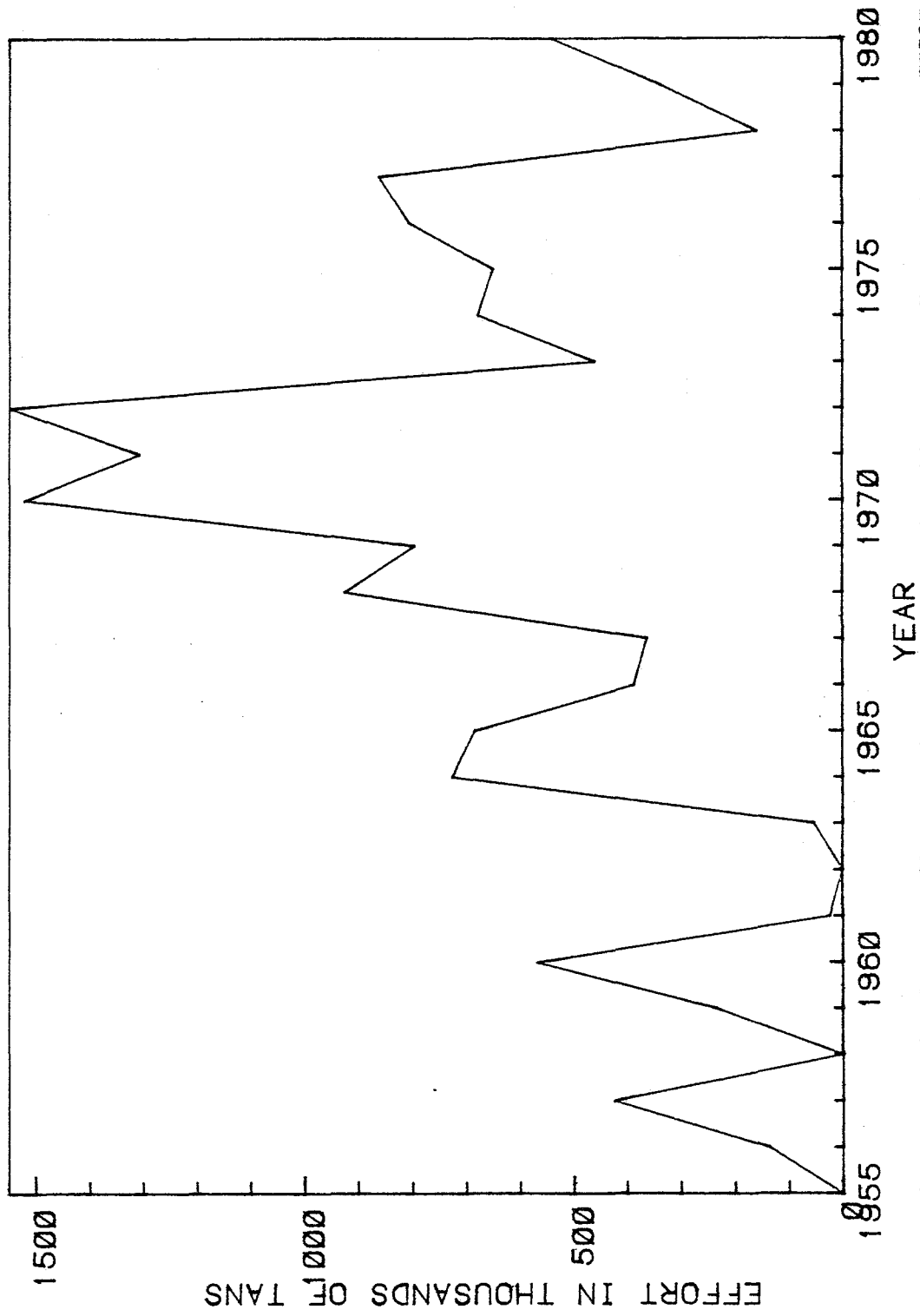


Figure 6.--Trend in fishing effort of the Japanese mothership salmon fishery in areas 7556E, 7558E, 8056, and 8058 of the Bering Sea, 1956-80.

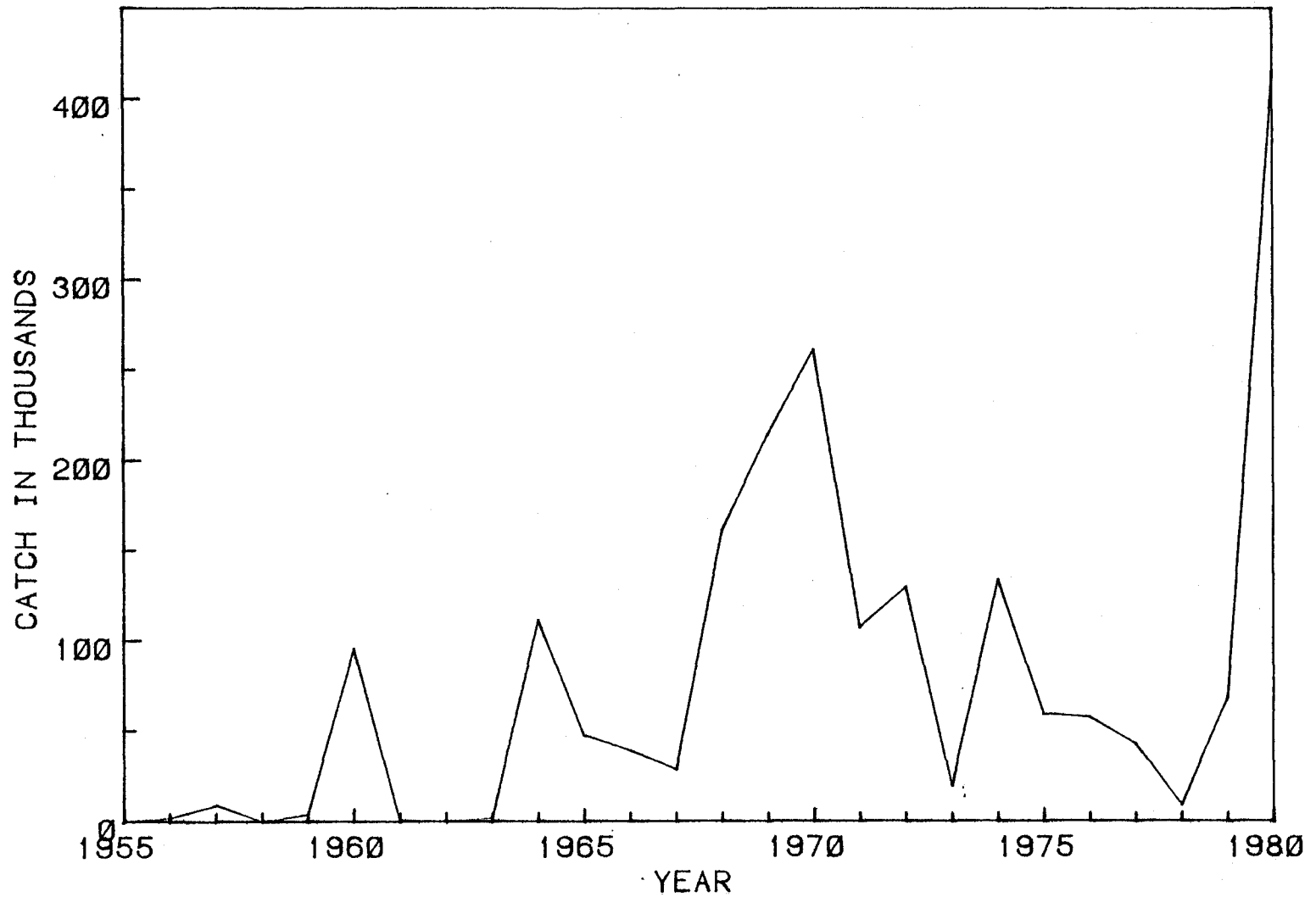


Figure 7.--Trend in catch of chinook salmon by the Japanese mothership salmon fishery in areas 7556E, 7558E, 8056, and 8058 of the Bering Sea, 1956-1980.

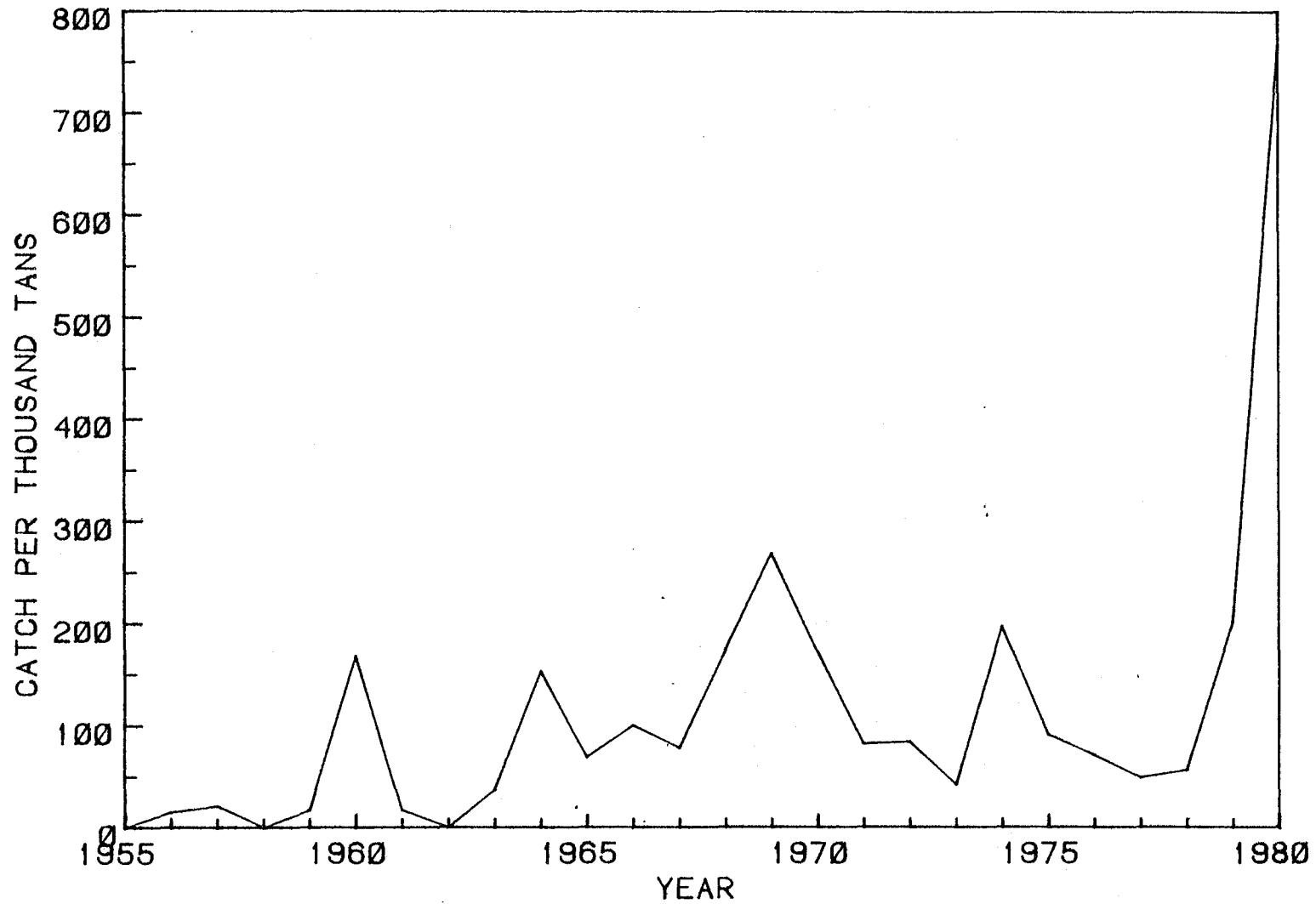


Figure 8.--Trend in catch of chinook salmon per thousand tans by the Japanese mothership salmon fishery in areas 7556E, 7558E, 8056, and 8058 of the Bering Sea, 1956-80.

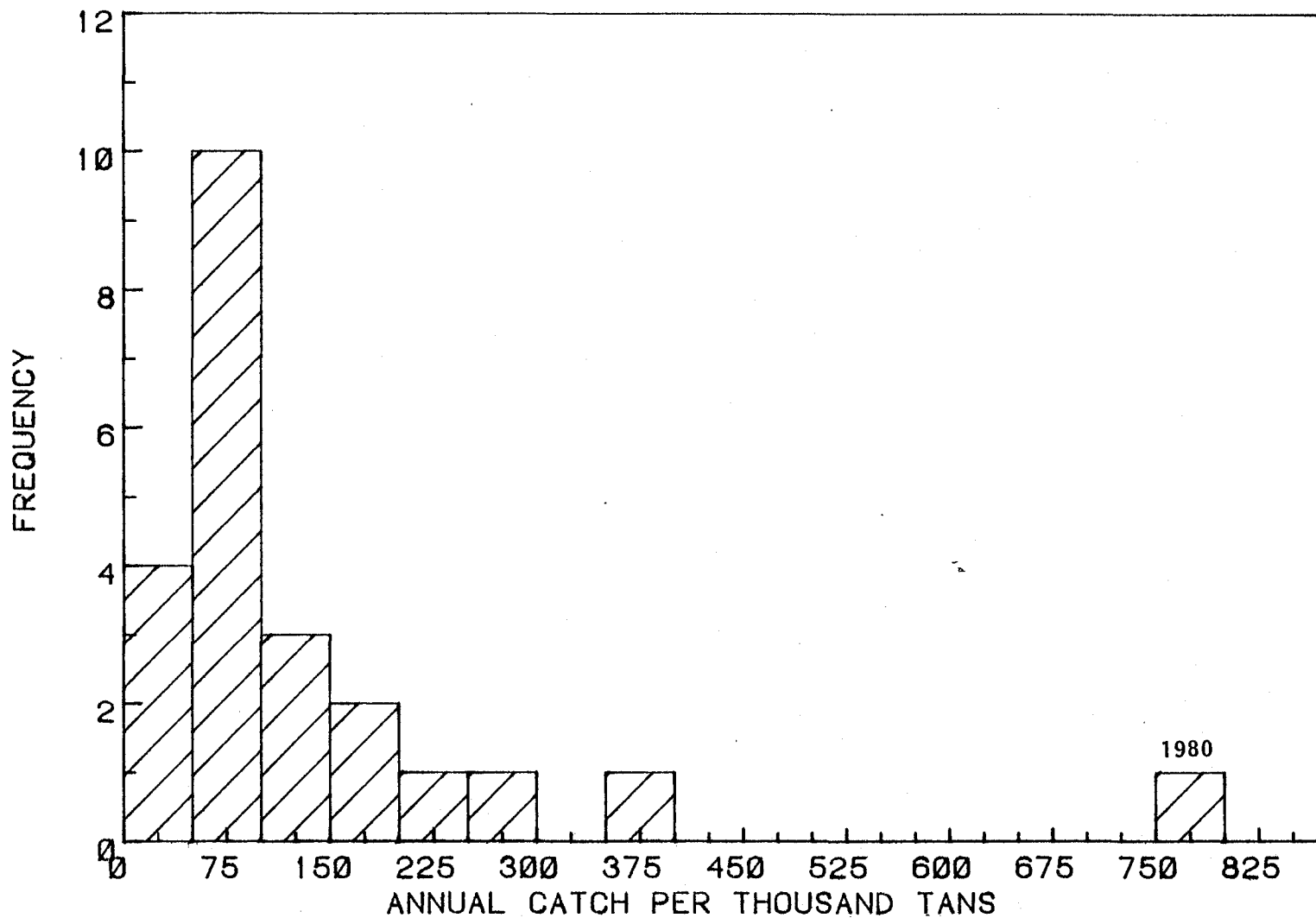


Figure 9.--Frequency distribution of annual catch per unit effort of chinook salmon by the Japanese mothership salmon fishery in 7556E, 7558E, 8056, and 8058 of the Bering Sea, 1956-80.

