



# JAPANESE, SOVIET, AND SOUTH KOREAN FISHERIES OFF ALASKA

## DEVELOPMENT AND HISTORY THROUGH 1966



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# CONTENTS

	<u>Page</u>
Introduction . . . . .	1
Japanese fisheries . . . . .	2
Eastern Bering Sea and Aleutian Islands groundfish trawl fishery . . . . .	4
Fish meal and oil . . . . .	4
Freezing operations . . . . .	6
Gulf of Alaska trawl fishery . . . . .	7
Eastern Bering Sea king crab fishery . . . . .	9
Central Bering Sea shrimp fishery . . . . .	11
High-seas salmon fishery . . . . .	12
Chukchi Sea salmon fishery . . . . .	15
Whaling . . . . .	15
Longline fishery . . . . .	18
Soviet fisheries . . . . .	19
Flounder fishery . . . . .	21
Herring fishery . . . . .	22
Pacific ocean perch fishery . . . . .	23
Gulf of Alaska . . . . .	24
Aleutian Islands . . . . .	25
Bering Sea . . . . .	26
King crab fishery . . . . .	26
Shrimp fishery . . . . .	28
Whaling . . . . .	29
Halibut and sablefish fishery . . . . .	31
South Korean fisheries . . . . .	32
Acknowledgments . . . . .	32
List of references . . . . .	33



# Japanese, Soviet, and South Korean Fisheries off Alaska

## Development and History Through 1966

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### ABSTRACT

The history of fisheries off Alaska by a nation from across the Pacific Ocean dates back to 1930. In that year Japan dispatched a king crab expedition into the eastern Bering Sea. Japanese exploitation of the eastern Bering Sea fishery resources was expanded in 1933 when a groundfish fishery was initiated. By 1941, Japan's fisheries in the eastern Bering Sea had been halted because the Imperial Navy had requisitioned most of Japan's vessels for use in World War II.

In 1952, after a lapse of 11 years, Japanese fishing off Alaska resumed. In that year the Japanese began fishing for salmon along the western Aleutian Islands. In 1953, they resumed their prewar fisheries in the eastern Bering Sea.

The Japanese fleets off Alaska were joined in 1959 by U.S.S.R. fleets, which began fishing flounder and king crab in the eastern Bering Sea and whaling along the Aleutian Islands.

During the early 1960's, both the Japanese and the Soviets accelerated their exploitation of the fishery resources off Alaska, working new grounds and taking additional species. By the close of 1966, fisheries of these two nations engulfed nearly all the 550,000 square nautical miles of the Continental Shelf off Alaska. Their fleets ranged from Dixon Entrance in the south and east, to beyond Attu Island in the west, and into the Arctic Ocean in the north. Also in 1966, another Asian nation, South Korea, made preparations to enter the fisheries off Alaska.

### INTRODUCTION

"Freedom of the seas" has many connotations, and the phenomenal expansion of Japanese and Soviet fisheries into the oceans of the world leaves no doubt that these two nations are taking advantage of that principle of international law.

The development of global fisheries by Japan and the Soviet Union has made those two nations world leaders in fisheries. Only Peru and possibly mainland China compare closely with Japan and the U.S.S.R. in annual fishery landings (Lyles, 1967). Japanese and Soviet fisheries in the North Pacific Ocean have been important factors in the rising status of the fishing industries of those nations. Within a few years, fisheries of both nations have spread rapidly across the North Pacific, engulfing Alaska's vast Continental Shelf from the central Bering Sea to British Columbia (table 1). Massive Japanese and Soviet fleets with some of the world's most

modern fishing and associated vessels operate year-round off Alaska and annually catch over 3 billion pounds of fish, shellfish, and whales. The monthly average number of Japanese and Soviet fishery vessels (excluding the Japanese high-seas salmon fleets) off Alaska in 1963-66 is shown in figure 1.

South Korean fishing off Alaska has consisted of an exploratory venture by one vessel in 1966. Entry of that nation, however, into the fisheries off Alaska on a large scale appears imminent.

A review of Japanese, Soviet, and South Korean fisheries off Alaska from their inception through 1966 is presented in this report. Much of the information has been gathered by Bureau of Commercial Fisheries agents while on enforcement and surveillance patrols of the foreign fisheries and from other unpublished sources. Published sources of information are cited.

Table 1.—Chronology of Japanese and Soviet fisheries off Alaska

Year	Japanese	Soviet
1930	Eastern Bering Sea king crab fishery initiated Asian fishing off Alaska.	
1933	Eastern Bering Sea fish meal and oil fishery constituted first foreign trawl fishery off Alaska.	
1940	Trawl fishery for groundfish frozen for human consumption began in eastern Bering Sea.	
1942-51	Fisheries off Alaska discontinued because of World War II.	
1952	First high-seas salmon fishery began off Alaska near the western Aleutian Islands.	
1953	Eastern Bering Sea king crab fishery resumed.	
1954	Eastern Bering Sea groundfish trawl fishery resumed.	
1959	North Pacific whaling extended to along Aleutian Islands.	King crab and flounder fisheries began in eastern Bering Sea, and whaling began along Aleutian Islands.
1960	Longline fishery for sablefish began in central and eastern Bering Sea.	Herring fishery began in central Bering Sea, and ocean perch fishery began in central and eastern Bering Sea.
1961	First shrimp fishery developed north of Pribilof Islands in central Bering Sea.	
1962	Trawling extended into Gulf of Alaska.	Ocean perch fishery extended into Gulf of Alaska.
1963	Longlining extended into Gulf of Alaska. Entered halibut longline fishery in eastern Bering Sea.	Shrimp fishery began in central Bering Sea. Ocean perch fishery spread to along Aleutian Islands.
1964		Shrimp fishery transferred from central Bering Sea to Gulf of Alaska.
1966	First high-seas salmon fishery began in Chukchi Sea.	

## JAPANESE FISHERIES

Most of Japan's fishing fleet was destroyed in World War II, but less than 20 years later Japan reemerged as a dominant nation in world fisheries and is now second in annual fishery landings. This expansion was accomplished through acquisition of large modern vessels and development of high-seas fisheries in all oceans of the world (Borgstrom, 1964). Resumption of her prewar fisheries and development of new fisheries in the eastern North Pacific Ocean, Bering Sea, and Gulf of Alaska (fig. 2) exemplify Japan's effort to regain her status as a leading fishing nation and have been a major factor in her success.

The worldwide spread of Japan's fisheries was hastened because her increasing population depends upon fish as a source of protein. After World War II, Japanese fishermen found some of their prewar fishing areas closed to them; these restrictions plus overcrowding in Japanese waters forced them to seek new grounds on the high seas. As the distance from Japan increased, some fishery operations became based overseas (Borgstrom, 1964).

Although private companies carry on Japan's fisheries, Government licenses control their areas and types of operation. The Fishery Agency licenses fishing vessels to operate in a specific area and for a specific period of time. Japanese vessels fishing off Alaska are generally licensed to fish in a given area for 1 year.

The various fisheries off Alaska use several types of vessels. They include small side trawlers, pair trawlers, Danish seiners (80-150 feet long), factory trawlers (120 to over 300 feet long), longline vessels (110-185 feet long), whale killers (185-225 feet long), gill netters (about 90 feet long), and factory ships (up to 650 feet long). Support vessels include a variety of refrigerated transports, cargo ships, and tankers.

Japanese fisheries off Alaska may be divided into two categories: (1) fleet operations that involve several fishing vessels which deliver their catches to a factory or processing ship, and (2) independent operations that involve fishing vessels which have their own processing facilities. Various support vessels usually service both types of operations.

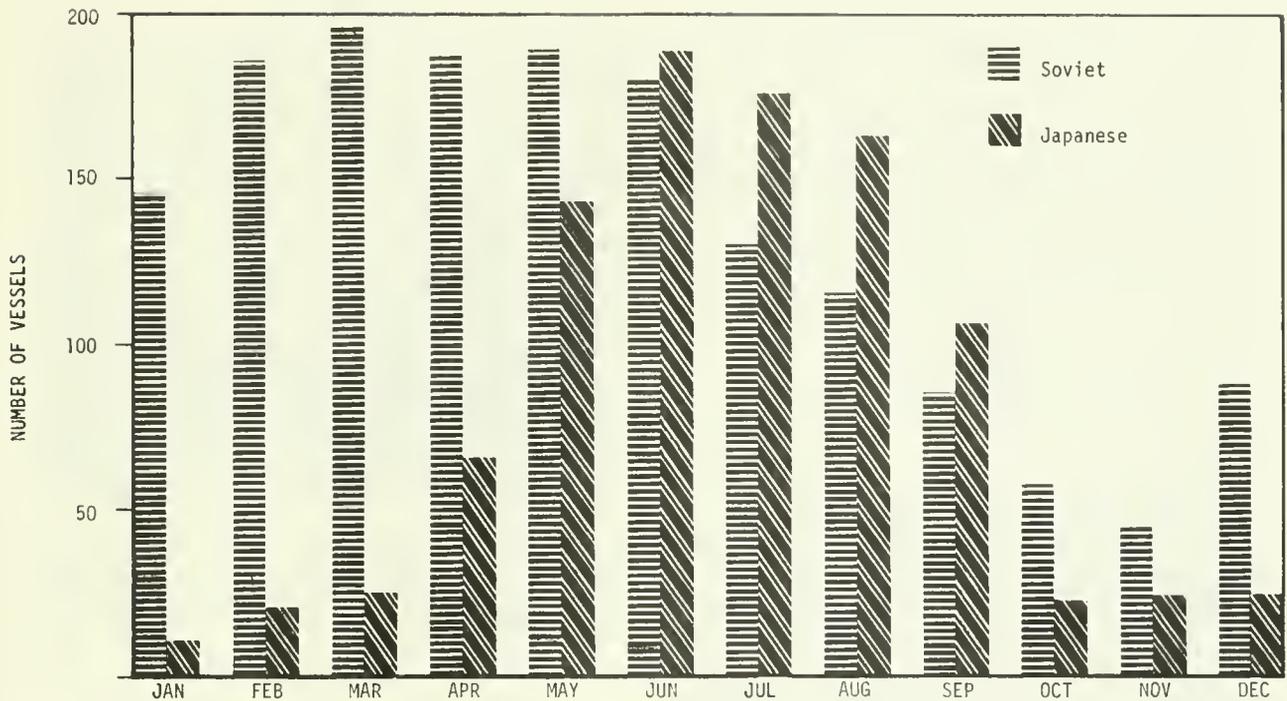


Figure 1.—Monthly average number of Soviet and Japanese fishing and associated support vessels off Alaska in 1963-66. (Japanese salmon fleet excluded.)

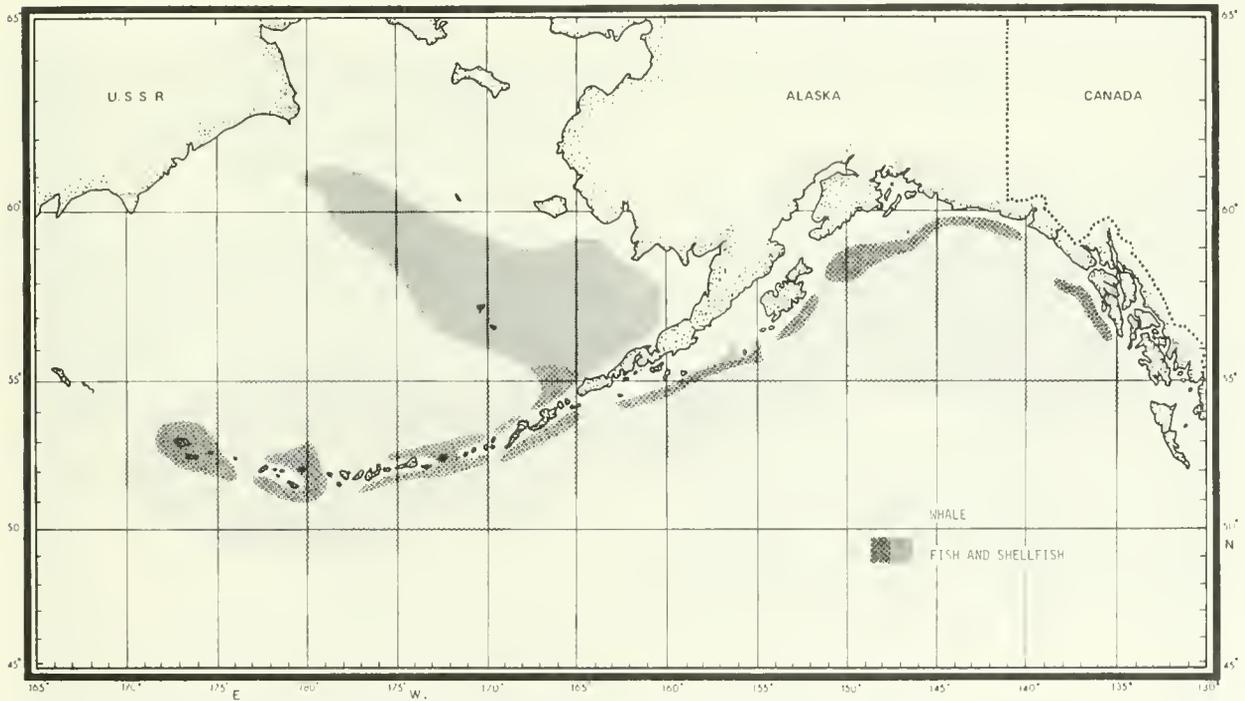


Figure 2.—Japanese fishing areas off Alaska. (Excluding high-seas salmon fishing areas.)

## EASTERN BERING SEA AND ALEUTIAN ISLANDS GROUNDFISH TRAWL FISHERY

The first trawling for groundfish off Alaska by an Asian nation occurred in 1929 when Japanese vessels explored the eastern Bering Sea. This exploration led to the development of a fullscale commercial fishery in the eastern Bering Sea in 1933 (Bourgois, 1951). This fishery has developed into the most intensive and productive of the Japanese fisheries off Alaska. It has two general categories: (1) reduction for fish meal and oil, and (2) freezing, primarily for food products. Yellowfin sole and walleye pollock are the principal species for reduction, and Pacific ocean perch and walleye pollock are the major species for freezing.

### Fish Meal and Oil

Japanese trawling in the Bering Sea for groundfish to be used for meal and oil (fig. 3) is the second oldest Asian-based fishery off Alaska (the Japanese fishery for Alaska king crabs began in 1930). The reduction fishery began in 1933 and was continued each year through 1937 by one fish meal and oil factory ship and her attendant trawlers, which fished the Continental Shelf in the eastern Bering Sea. The catch rose annually, increasing from 3,600 short tons in 1933 to 44,000 tons in 1937 (Kibesaki, 1965). World War II forced the Japanese to stop fishing in distant waters and ended the fish meal and oil fishery in the eastern Bering Sea.



Japanese pair or bull trawlers fishing for groundfish in the eastern Bering Sea. The two vessels tow one trawl by means of a cable from the stern of each ship. These two vessels belong to a fleet of trawlers accompanying a factory ship which processes their catches.

In 1958 Japan resumed her fish meal and oil fishery in the eastern Bering Sea (Kibesaki, 1965) and in 1960 extended the fishery into the central Bering Sea. From one to five factory ship fleets were active in this fishery

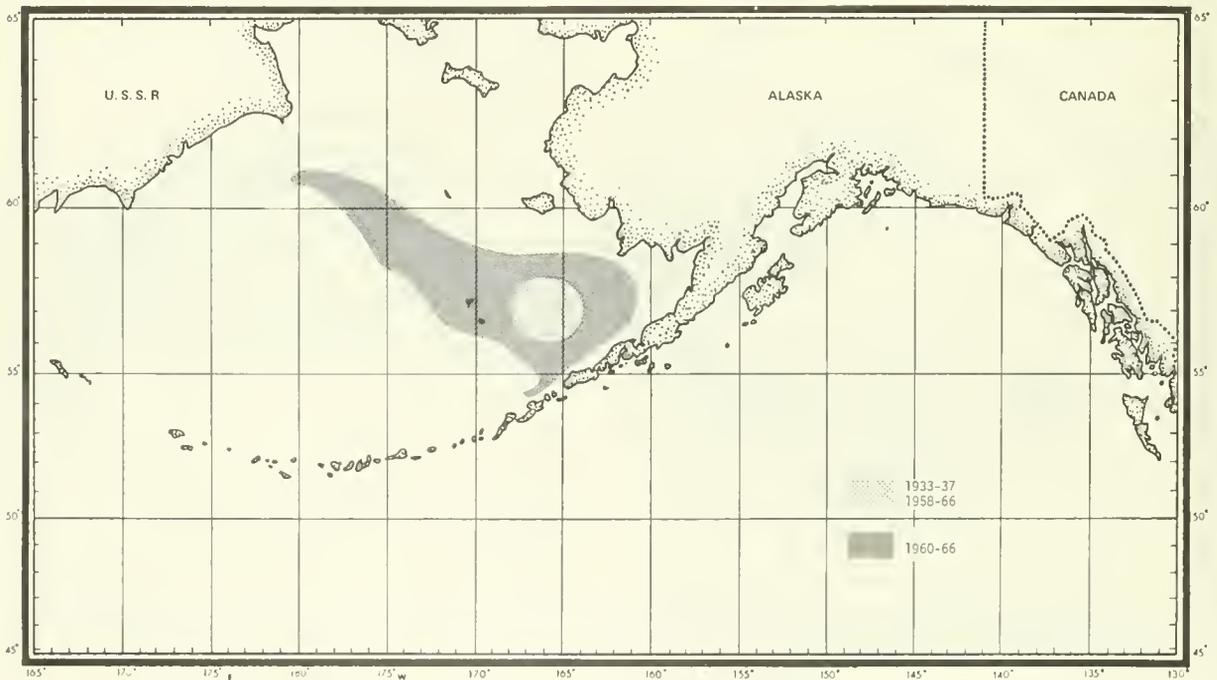


Figure 3.—Japanese Bering Sea and Aleutian Islands groundfish trawl fishing areas—fish meal and oil.

in 1958-66 (table 2), and fishing in these years began between March and early May and continued into October. The effort increased in both 1959 and 1960 and remained at a high level through 1962. The annual catch increased from 31,200 tons in 1958 to an estimated 440,000 tons in 1962, but the catch per unit of effort and average size of the species decreased in these years. This development combined with a depressed world meal market at that time led to a reduction of effort in 1963. The number of vessels varied widely in 1963-66, and so did the annual catches which ranged from an estimated 180,000 tons in 1963 to an estimated 350,000 tons in 1966.

Table 2.—Number of vessels in the Japanese fish meal and oil fishery off Alaska, 1958-66

Year	Factory ships	Trawlers
	Number	Number
1958	1	20
1959	2	44
1960	5	125-135
1961	5	125-135
1962	4	112
1963	2	54
1964	4	119
1965	3	65
1966	4	88

to the cod end filled with fish, and the entire cod end is hauled aboard the factory ship. The trawler gets an empty cod end from the kawasaki and resumes fishing. The cod end with fish is emptied on deck of the factory ship. The large flounders (mostly yellowfin sole) and other desirable species are selected from the catches and are frozen. The remaining fish are reduced to meal and oil. In 1966 at least one of the fish meal and oil factory ships in the eastern Bering Sea used walleye pollock to make minced fish meat. Minced fish meat is an ingredient in fish sausage and cake in Japan.



The larger sole and other desirable species of fish being selected from tons of groundfish on deck of a Japanese factory ship in the eastern Bering Sea. The selected fish are frozen for human consumption, and the remaining mass of fish are reduced into meal and oil or made into minced fish meat.



Japanese factory ship and two of her accompanying trawlers in the eastern Bering Sea. The trawlers' catches of groundfish are delivered to the factory ship primarily for production of fish meal and oil and minced fish meat.

In a typical fish meal and oil operation, the trawlers fish within a 5- to 10-nautical mile radius of their factory ship, which is generally anchored, and deliver their catches to the factory ship for processing. Several of the trawlers use otter trawls with detachable cod ends. As they approach the factory ship, these vessels are met by a "kawasaki" (work boat), which carries a cable leading from a winch on the factory ship. The cable is attached



Groundfish stored in bins on deck of a Japanese factory ship in the eastern Bering Sea. After the desirable fish to be frozen for human consumption have been removed from the catches delivered to factory ships, the fish are stored on deck for subsequent conveyance below deck where facilities for reduction and minced meat production are located.

## Freezing Operations

The Bering Sea and Aleutian Islands trawl fishery (fig. 4) in which the catches are frozen for human consumption was the last Japanese fishery off Alaska to be ended by World War II and one of the first fisheries to be resumed after the war. The first trawlers that were known to have fished off Alaska for groundfish to be frozen accompanied a factory ship in the eastern Bering Sea in 1940. The fleet had nine trawlers, which fished on the Continental Shelf in the eastern Bering Sea during the summer. In the summer of 1941 another fleet, consisting of a factory ship and 12 trawlers, fished in the same area. Trawling in the Bering Sea was discontinued from 1942 through 1953 (Alverson, Pruter, and Ronholt, 1964).

The Japanese resumed freezer operations in the eastern Bering Sea in 1954 (Kibesaki, 1965). Each year in 1954-59, two to four factory ships, each with four to eight trawlers, operated in this fishery. Fishing took place in the eastern Bering Sea from late August to early October, and the catches ranged from nearly 11,000 tons in 1955 to almost 33,000 tons in 1959. A few independent factory trawlers that froze their own catches also fished in the eastern Bering Sea in 1954-59.

From 1960 through 1963 freezer operations in the eastern Bering Sea decreased to 1 factory ship accompanied by about 10 trawlers, and a few independent factory trawlers. Fishing was shifted from on the Continental Shelf of outer Bristol Bay to along the edge of the Continental Shelf in the eastern and central Bering Sea and north of the eastern Aleutian Islands. As a result of the change to deeper grounds, the

species composition of the catches changed from flatfish and walleye pollock to primarily Pacific ocean perch and walleye pollock.

Fishing was extended to the entire Aleutian Islands chain in 1964, and the independent trawlers increased to at least seven factory trawlers and two small otter trawlers. Most of the catch was ocean perch. The independent trawlers began to fish in March and continued through the year; individual vessels fished from 2 to 8 months. One factory freezer ship with 28 catcher vessels operated in the eastern Bering Sea in 1964. This fleet arrived in May and had moved west to the Soviet coast by late June.

Freezer operations became more intense in 1964—in action were 9 factory trawlers, 4 small otter trawlers, and 2 factory ships accompanied by a total of 29 trawlers. Independent trawlers fished along the Aleutian Islands chain and in the eastern Bering Sea throughout the year; they fished from 3 to 11 months. One of the factory ship fleets fished along the Aleutian Islands from late July to September, and the other fleet operated along the Aleutian Islands and in the eastern Bering Sea from mid-April to July and again from August into September.

The level of this fishery rose again in 1966 when 14 factory trawlers, 2 small otter trawlers, and 2 factory ships accompanied by 11 trawlers caught and froze fish. An intensive fishery for walleye pollock developed along the 100-fathom curve north of the Fox Islands in the eastern Aleutian Islands. Pacific ocean perch, which had previously dominated the catches in all areas, remained the primary species south of the eastern Aleutians, along the central and western Aleutians, and along the

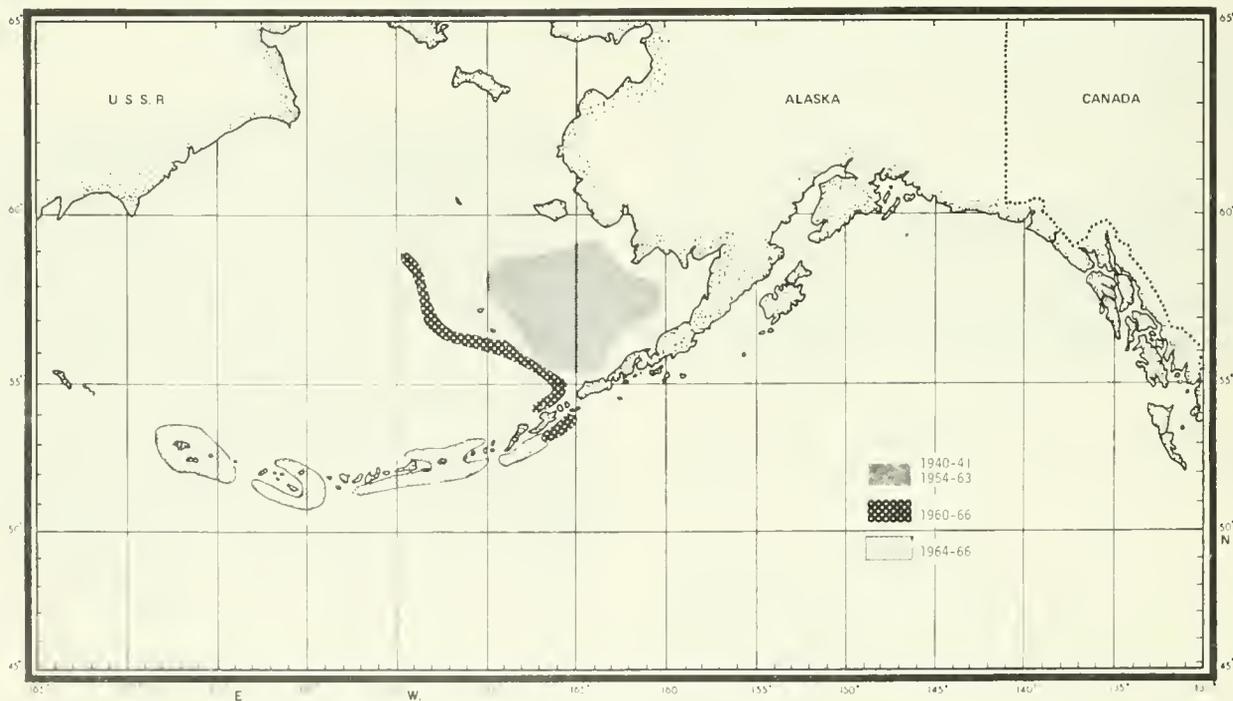


Figure 4.—Japanese Bering Sea and Aleutian Islands groundfish trawl fishing areas—freezer operations.

100-fathom curve in the eastern Bering Sea. The independent trawlers were active in this fishery for periods of 1 to 9 months, and several of them also trawled in the Gulf of Alaska. A factory ship accompanied by 11 trawlers arrived north of the Fox Islands in early February. This fleet remained in that area catching walleye pollock for production of minced fish meat until the factory ship returned to Japan in April. Another factory ship and the 11 trawlers moved northwest of the Pribilof Islands to take shrimp. After 1 week, however, this fleet stopped shrimping because catches were poor. The fleet then shifted to the western and central Aleutian Islands, fished for Pacific ocean perch until late September, and returned to Japan. In late December, this same factory ship accompanied by about eight trawlers returned to the pollock fishery north of the Fox Islands and resumed production of minced fish meat.

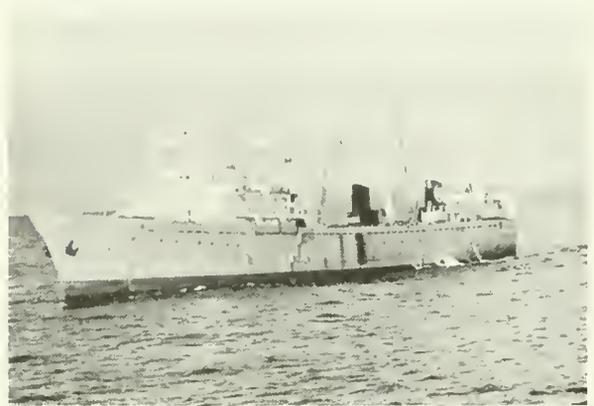
### GULF OF ALASKA TRAWL FISHERY

The Japanese trawl fishery in the Gulf of Alaska (fig. 5) began in 1963 following brief exploratory fishing by two trawlers in 1962. Each year the effort in this fishery has been increased, and it has developed into a year-round operation.

In the United States, the Government and the fishing industry expressed concern about the Japanese trawling in the Gulf of Alaska because of its possible detrimental effects on the stocks of halibut and king crab. The Fishery Agency, therefore, incorporated the following restrictions in licenses issued to those vessels authorized to fish in the Gulf: (1) halibut, salmon, or king crab that

were caught were to be returned to the sea, and (2) fishing was to be confined to an area north of lat.  $50^{\circ}$  N. and between long.  $145^{\circ}$  W. and  $170^{\circ}$  W. Under the auspices of the INPFC (International North Pacific Fisheries Commission), arrangements were made to place North American observers aboard Japanese trawlers in the Gulf of Alaska to determine the number and viability of halibut taken by the Japanese.

The fishery in 1963 involved one factory trawler, two side trawlers, and one factory ship with three catcher vessels. They fished primarily on Albatross Bank and also on Portlock Bank and along the 100-fathom curve from Chirikof Island to Unimak Pass. Trawling began in



Japanese factory trawler fishing for ocean perch in the Gulf of Alaska. Japanese factory trawlers are equipped with complete facilities for processing and refrigerated storage, which enable them to operate as independent units.

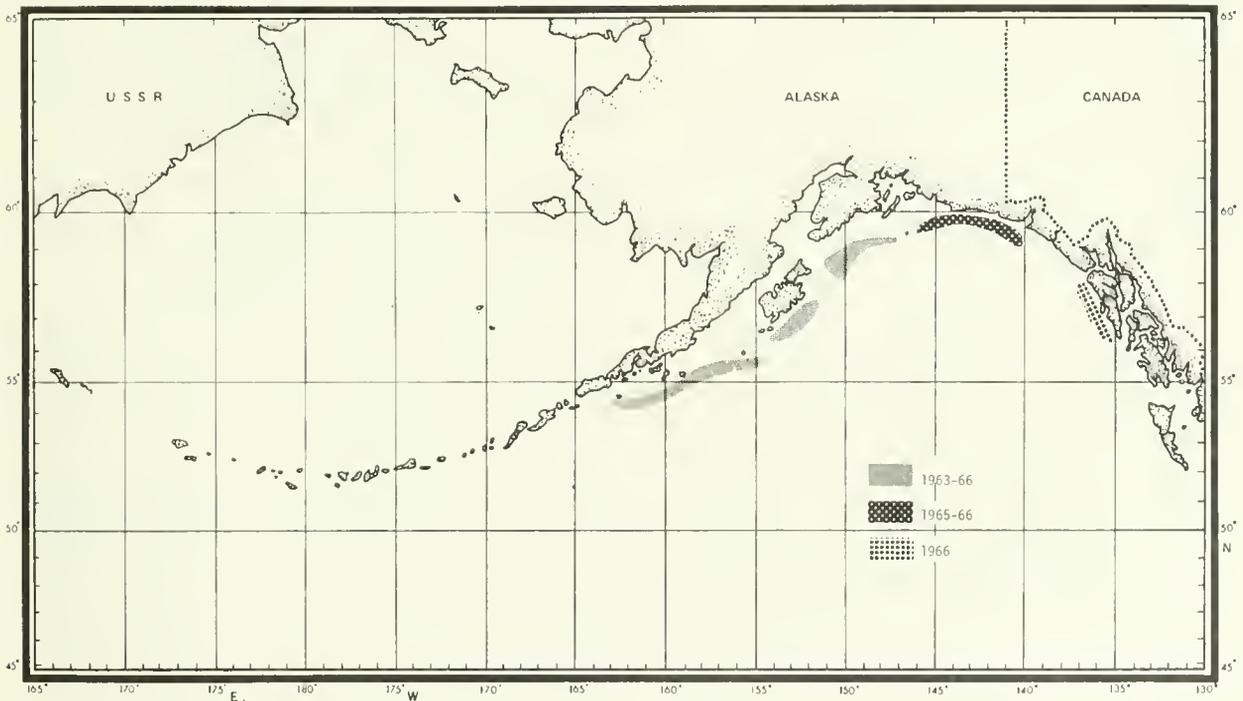


Figure 5.—Japanese Gulf of Alaska trawl fishing areas.



Cod end of a trawl containing several tons of ocean perch coming aboard Japanese factory trawler in Gulf of Alaska. The trawl is taken aboard via a stern ramp. The large after deck of Japanese factory trawlers provides space for carrying extra gear for repairing trawls.



Emptying trawl on Japanese factory trawler off Kodiak Island in Gulf of Alaska. The cod end of the trawl is raised above deck, and the fish go through a hatch at the top of the stern ramp and then directly to the processing facilities below deck.

February and ended in October. The combined catch of the three trawlers was 10,310 tons—6,635 tons of perch, 2,971 tons of other demersal species, and 704 tons of shrimp (International North Pacific Fisheries Commission, 1965b). The catcher vessels accompanying the factory ship fished from late April to mid-September with sunken gill nets. They caught 1,710 tons of fish, 96 percent of which were sablefish (International North Pacific Fisheries Commission, 1963b). The Japanese were apparently not satisfied with the results with the sunken gill nets because they have not used that type of gear again in the Gulf.

The Fishery Agency in 1964 licensed six trawlers (four factory trawlers and two side trawlers) to fish in the Gulf of Alaska and extended the geographical limits of the fishing area by 10 degrees in the east and 5 degrees in the west. The first factory trawler began fishing in April, and a second began in June. The remaining two factory trawlers began fishing in early August, and all four trawled in the Gulf until October. The factory trawlers fished mainly for Pacific ocean perch, primarily on Albatross Bank but also on Portlock Bank and along the 100-fathom curve from Chirikof Island to Unimak Pass. One of the side trawlers began fishing in the Gulf in May, and the other began in June. They trawled until late October near the Trinity Islands off the southwest end of Kodiak Island, mostly for shrimp. The Gulf catch in 1964 was 14,696 tons of perch, 4,437 of other groundfish, and 2,608 tons of shrimp (International North Pacific Fisheries Commission, 1965b).

The Japanese increased the fleet in the Gulf of Alaska in 1965 to six factory trawlers and five small trawlers. The fishery was begun by 1 trawler in late February, increased to 4 trawlers by April, and reached a peak of 10 trawlers in June and July. Five of the trawlers fished until early November; thereafter only one vessel fished. In December, however, the effort increased to four trawlers, which fished the first 3 months of 1966—the first winter Japanese trawl fishery in the Gulf. Most of the trawling in 1965 was concentrated on Albatross

Bank, although some fishing also took place along the 100-fathom curve in the western Gulf, on Portlock Bank, and, for the first time since the Japanese entered the Gulf, on the Yakutat grounds in the eastern Gulf. I estimate the catch totaled about 60,000 tons—80 percent Pacific ocean perch, and 20 percent other groundfish. One of the factory trawlers fished briefly for shrimp but after a few days of poor catches resumed trawling for ocean perch.

The trawl fishery in the Gulf of Alaska increased in 1966 to 10 factory trawlers and 5 small trawlers. Four of the vessels were licensed to fish east of long. 135° W. and north of lat. 30° N., which encompasses the coasts of southeastern Alaska, British Columbia, and the Pacific Northwest States. The four trawlers in the Gulf at the beginning of the year fished until March and then returned to Japan. The fishery was resumed by 1 trawler in April and reached a peak of 13 trawlers in September. The number of vessels then began to decline, and only one or two trawlers were in the Gulf at the end of the year. Most of the trawling in the Gulf in 1966 was along the 100-fathom curve in the western Gulf and on Albatross and Portlock Banks in the central Gulf. For the first time, Japanese trawlers appeared off the coast of southeastern Alaska. The Japanese trawlers caught an estimated 66,000 tons of fish (mostly Pacific ocean perch) in the Gulf in 1966. Five hundred tons of shrimp were caught by the two small trawlers in the Shumagin Islands area and near the Trinity Islands off southwest Kodiak Island (International North Pacific Fisheries Commission, 1966b).

The Japanese freeze most of the fish they catch in the Gulf of Alaska. Pacific ocean perch are headed and eviscerated by machine, quickfrozen, packed in cartons, and held in refrigerated holds aboard trawlers until transported to Japan by refrigerator ships. Other species of groundfish, such as walleye pollock, arrowtooth flounder, and sablefish, are filleted or dressed mostly by hand and are frozen. Some of the factory trawlers are equipped with reduction plants and produce fish meal and oil from the offal and the less desirable species of fish.

## EASTERN BERING SEA KING CRAB FISHERY

The Japanese eastern Bering Sea king crab fishery (fig. 6), which began in 1930,<sup>1</sup> was the first fishery off Alaska by an Asian nation. It was also one of Japan's earliest distant-water fisheries.

This fishery in prewar years took place in 1930 and in 1932 through 1939. In its first year, the fishery involved one factory ship and a small fleet of catcher vessels which, with tangle nets, harvested about 1 million king crabs. The fishery was resumed in 1932 and continued through 1939. One factory ship fleet operated in each of these years except in 1933-34, when there were two fleets. The annual catch increased from about 1.3 million crabs in 1932 to slightly over 2 million crabs in 1933 and then steadily declined to about 250,000 crabs in 1939.<sup>2</sup>

The quota was increased to 59,850 cases in 1954-58, to 70,000 cases in 1959, and to 80,000 in 1960. The annual catch varied from 1.1 to 1.6 million crabs in 1953-60. During these years, the fishery was from April into July or August (International North Pacific Fisheries Commission, 1953-60).

The Japanese had what were termed spring and autumn king crab fisheries in the eastern Bering Sea in 1961-62. The spring fishery was from April into July, and the autumn fishery from August into November. The two or three factory ship fleets in these fisheries apparently did not fish an equal ratio of tangle net gear, because the catch is not proportional to the number of fleets (table 3) (International North Pacific Fisheries Commission, 1961 and 1963a).

Beginning in 1963, the king crab fishery in the eastern Bering Sea changed to a single-season operation,

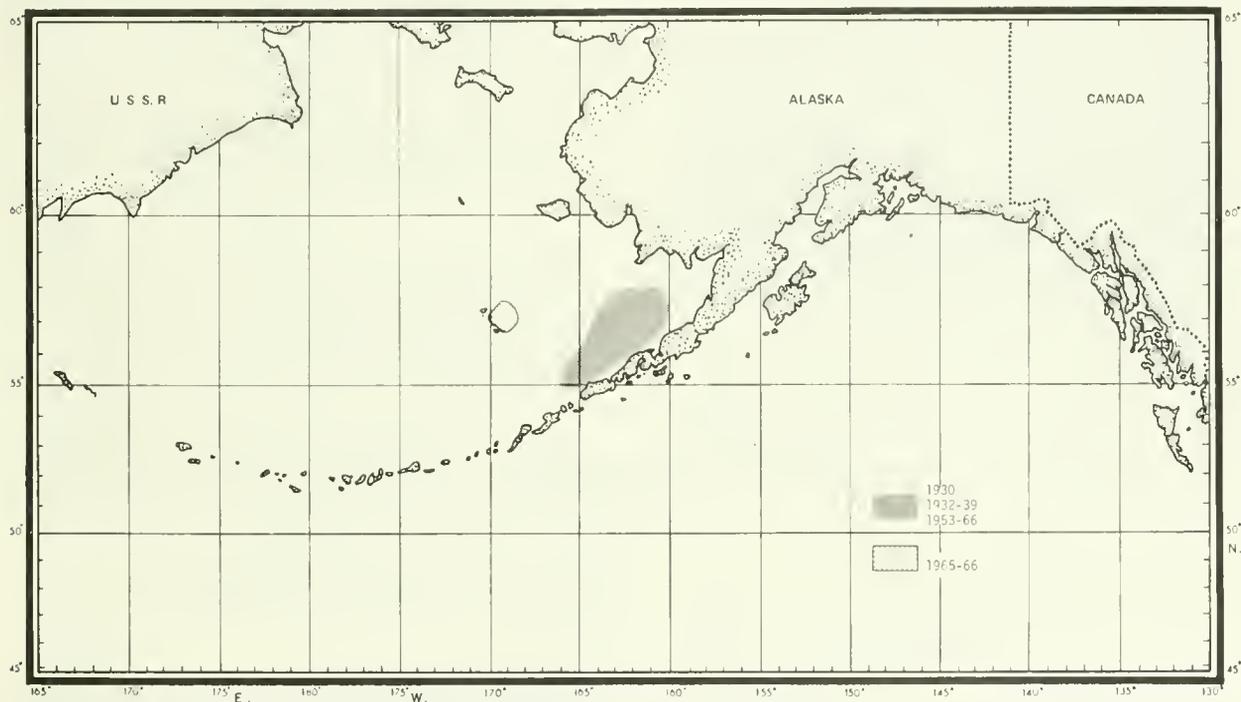


Figure 6.—Japanese eastern Bering Sea king crab fishing areas.

The Japanese eastern Bering Sea king crab fishery was resumed in 1953, after a lapse of 13 years and involved one factory ship fleet each year through 1961. In 1953-54, tangle nets and trawls were both used, but in 1955 trawling was discontinued and since then only tangle nets have been used in this fishery. In 1953 the Japanese Government set a quota of 58,240 cases (24 pounds per case) for the eastern Bering Sea crab fishery.

and canning became the sole method of processing. From 1963 through 1966, two canning factory ships, each accompanied by about five trawlers that set tangle nets, engaged in this fishery. Fishing began in March and ended between late August and early October in those years.

The Japanese Government established a combined annual quota of 235,000 twenty-four-pound cases for the two fleets in 1963 and 1964; the total catch was about 5.5 million crabs in 1963 and 5.9 million crabs in 1964 (International North Pacific Fisheries Commission, 1964 and 1965a).

The United States and Japan signed a 2-year agreement in November 1964 whereby it was agreed that to avoid possible overfishing of the king crab resource in the eastern Bering Sea Japan would limit her annual

<sup>1</sup>Shippen, Herbert, and staff of king crab investigators, 1964. The fishery for king crabs in the eastern Bering Sea. Bur. Commer. Fish. Biol. Lab., 2725 Montlake Blvd. E., Seattle, Wash. 98102, manuscript, 50 pp.

<sup>2</sup>See footnote 1.

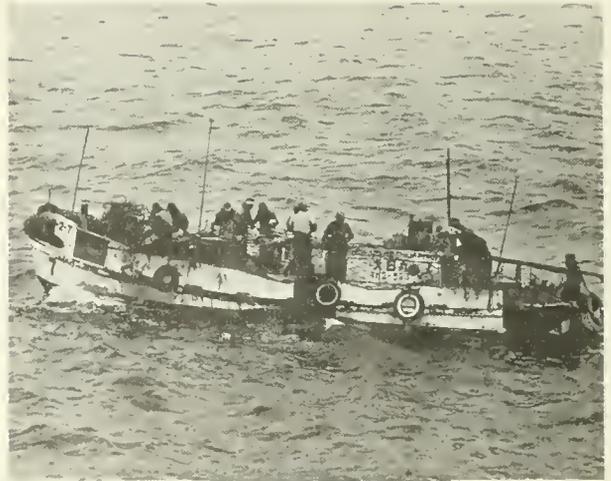
Table 3.—Japanese eastern Bering Sea king crab statistics, 1961-62

Year	Fishery	Factory ship fleets	Crabs caught	Cases <sup>1</sup> of canned meat	Frozen meat
		Number	Number	Number	Pounds
1961	Spring	2	1,946,530	80,000	485,365
1961	Autumn	3	1,082,205	-	1,412,849
1962	Spring	3	3,235,840	130,000	635,501
1962	Autumn	2	1,714,960	-	1,649,797

<sup>1</sup>One case contains 24 pounds of meat.

commercial catch to the equivalent of 185,000 twenty-four-pound cases for the years 1965 and 1966. The Japanese reached the quota in both years; they caught about 4.2 million crabs each year. In November 1966 the agreement was extended for 2 more years, but the annual Japanese quota was reduced to 163,000 cases.

Since it began in 1930, the Japanese have carried on their king crab fishery on the vast Continental Shelf north of the Alaska Peninsula. The fleets normally begin fishing north of Unimak Island and by early summer have worked progressively east to north of Port Moller. Late in the season they reversed this pattern and stopped fishing when they were north of Unimak Island. In 1965-66, the Japanese also fished for king crab just east of the Pribilof Islands. One fleet operated in that area for 1 or 2 months in each of these years. They caught blue king crabs, which, although a different species, are quite similar to the crabs caught north of the Alaska Peninsula. Japanese sources have continually reported that their fleets experienced severe competition with the Soviet crab fleets on the Bristol Bay flats north of the Alaska Peninsula and implied that the shift to the



King crab being removed from Japanese tangle net gear in the eastern Bering Sea. The "kawasaki" or picker boats retrieve tangle nets, and the crabs are removed from the net as it is brought aboard. Both the crab and the nets are returned to the factory ship where the crabs are canned and nets are subsequently transferred to trawlers for resetting.

Pribilof area was to avoid gear losses caused by such conflicts. Immediately after the Soviet crab fleets left the eastern Bering Sea in 1965-66, the Japanese fleet that was fishing near the Pribilofs returned to the grounds north of the Alaska Peninsula.

Historically the Japanese have fished for king crab with tangle nets which are anchored on the sea bed and entangle the crabs. Each trawler sets nets that cover about 10 square miles. The amount of time the tangle nets soak, or fish, before being hauled and picked depends on the abundance of crabs, and generally varies from 1 to 6 weeks. Kawasakis carried in davits on the factory ships retrieve the nets. The crabs are removed as the nets are brought aboard the kawasakis, and both the nets and the crabs are delivered to the factory ships.



Japanese crab factory ship in eastern Bering Sea. Japanese crab factory ships are accompanied by five special tangle net setting trawlers (not pictured) and carry up to 12 "kawasaki" or picker boats like the one slung in the forward davit and the one in the water alongside. The vertical bamboo poles atop the house and astern of the factory ship support platforms of tangle nets.



King crab meat being shaken from the shells in a Japanese factory ship in the eastern Bering Sea. Complete processing is done on the fishing grounds, largely by hand labor.

## CENTRAL BERING SEA SHRIMP FISHERY

Japan expanded her fisheries on Alaska's Continental Shelf in 1961 with a shrimp fishery in the central Bering Sea north of the Pribilof Islands (fig. 7). This venture was the first foreign fishery for shrimp off Alaska.

Factory ships accompanied by trawlers are employed in this fishery. The number of vessels increased from 1 factory ship and 16 trawlers in 1961 to 3 factory ships and 38 trawlers in 1963. Each year thereafter the number of vessels was reduced and by 1966 had dropped to 1 factory ship and 13 trawlers (table 4).



Cans of hand-packed king crab meat being checked for appropriate weight on Japanese factory ship in eastern Bering Sea. Inspected cans are conveyed to next compartment where they are sealed and then cooked in retorts.

The crabs are butchered, the meat is extracted (after cooking), and the cans are packed by hand aboard the factory ships. After processing, the cans are packed in cardboard cartons and stored for shipment to Japan aboard cargo or supply ships.

In 1965 and 1966 the Japanese fished experimentally for king crab with pots in the eastern Bering Sea. The pots were of two types—rectangular and beehive. The Japanese reported that neither type of pot has been very successful, but that neither type has been fished very extensively.



Japanese factory ship engaged in the shrimp fishery in the central Bering Sea. An accompanying fleet of trawlers delivers the shrimp catches to the factory ship for processing.

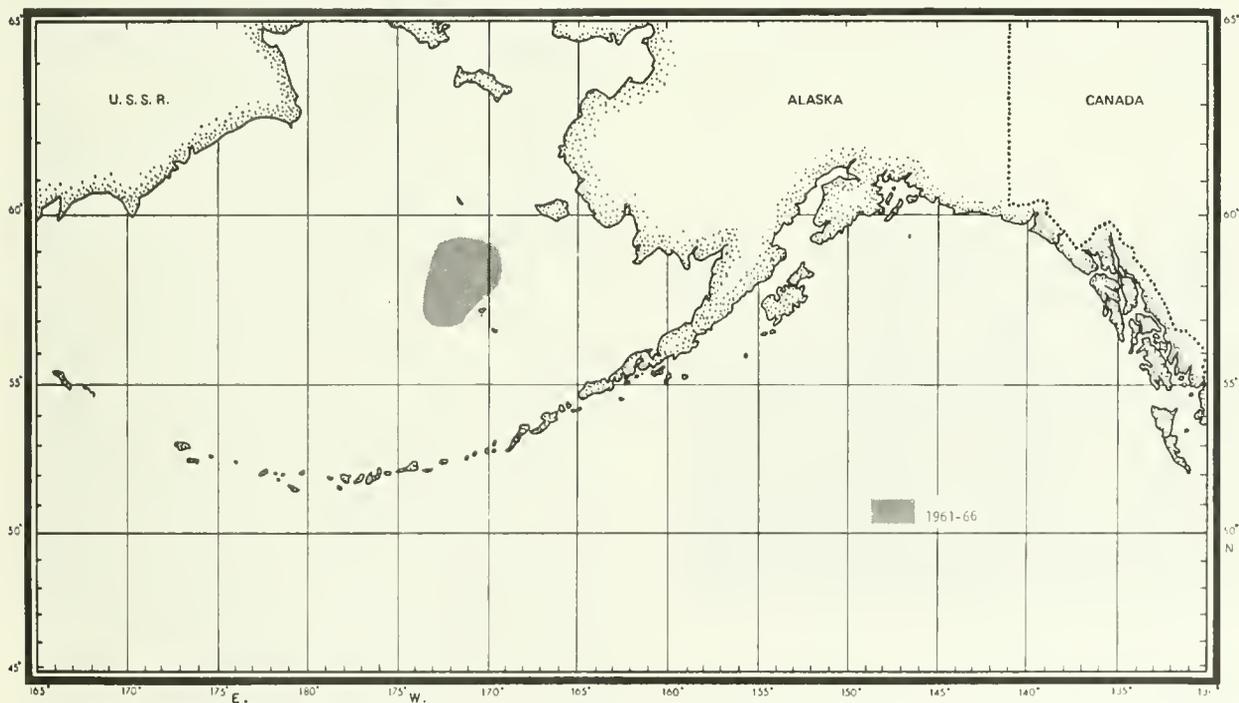


Figure 7.—Japanese central Bering Sea shrimp fishing area.

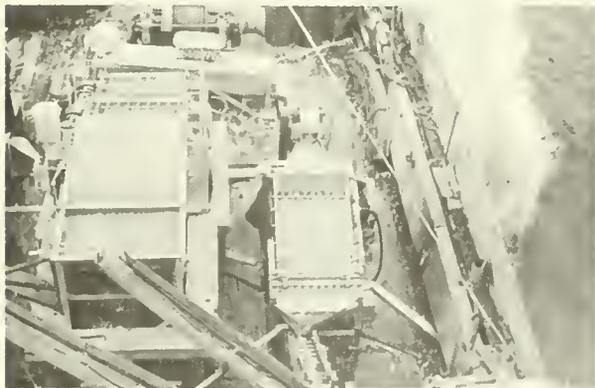
Table 4.—Japanese central Bering Sea shrimp fishery statistics<sup>1</sup>

Year	Factory ships	Trawlers	Shrimp Tons	Period of fishing	
	Number	Number		Began	Ended
1961	1	16	11,250	February	December
1962	3	38	23,100	February	December
1963	2	31	34,775	February	December
1964	2	23	22,550	February	December
1965	2	27	7,630	March	September
1966	1	13	3,230	May	August

<sup>1</sup>International North Pacific Fisheries Commission, 1965a and 1966b.



Shrimp entering processing system on Japanese factory ship in eastern Bering Sea. The shrimp are transferred in baskets from the trawlers to the deck of a factory ship and then shoveled onto a conveyor which carries them to peelers and then below deck to processing facilities.



Shrimp peelers on deck of a Japanese factory ship in central Bering Sea. The meat is extracted from the shrimp by mechanical peelers on deck and then conveyed to below deck where facilities for canning and freezing are located.

The catch increased from 11,250 tons in 1961 to 34,775 tons in 1963 and then decreased to 3,230 tons in 1966 (table 4). Members of the Japanese fishing industry and of the Japanese Fishery Agency have attributed the decreased catches in 1964-66 to a declining abundance of shrimp in the central Bering Sea but do not entirely agree on the cause of this decline. Members of the industry said that changing oceanological conditions were the sole cause, whereas a spokesman for the Fishery Agency said overfishing was also a major factor.

Because of low catches of shrimp in 1965, 1 of the 2 factory ships and 12 of the 27 trawlers switched to groundfish trawling along the Aleutian Islands a few weeks after entering the shrimp fishery. Later that fall, this fleet returned to the shrimp fishery for about one month before sailing for Japan.

The shrimp fishery is centered around a factory ship which receives the catches from accompanying trawlers. Aboard the factory ship, the shrimp (principally pink and sidestripe) are peeled by machine and cooked; most of the meat is canned although some is frozen. Incidental catches of groundfish (mostly Pacific ocean perch) in the shrimp fishery are retained and frozen.

### HIGH-SEAS SALMON FISHERY

Japan began fishing for salmon on the high seas in the early 1900's and continued until World War II. During this period, the fishery was confined essentially to the western North Pacific off the coast of the Soviet Union (Kasahara, 1961), the sole exception being in 1937 when a factory ship and three catcher vessels made a brief foray to the Bristol Bay area of the eastern Bering Sea. This exploratory expedition met strong opposition from the United States Government. This opposition apparently caused cancellation of any Japanese plans to develop a salmon fishery in the area.

When the Japanese resumed fishing for salmon on the high seas in 1952, the area of operations was greatly expanded over that of the prewar years. In 1952, fishing was extended east in the North Pacific Ocean from off the Soviet coast to south of the Aleutian Islands almost to the 180th meridian (Kasahara, 1961; International North Pacific Fisheries Commission, 1952). This expansion marked the beginning of a Japanese high-seas commercial salmon fishery in the Alaska area (fig. 8).

After World War II, the United States initiated discussions with the Governments of Japan and Canada concerning the formulation of a treaty relating to the fishery stocks of mutual concern to the three countries. A treaty, the International Convention of the High Seas Fisheries of the North Pacific Ocean, was concluded by the three countries and entered into force in 1953. This Convention contains the concept of abstention under which nations which have not historically participated in the fishery would abstain from doing so as long as those countries which have developed the fishery continue to carry out measures of conservation and full utilization. Japan accordingly agreed to abstain from fishing for salmon east of a provisional line established at meridian 175° W.

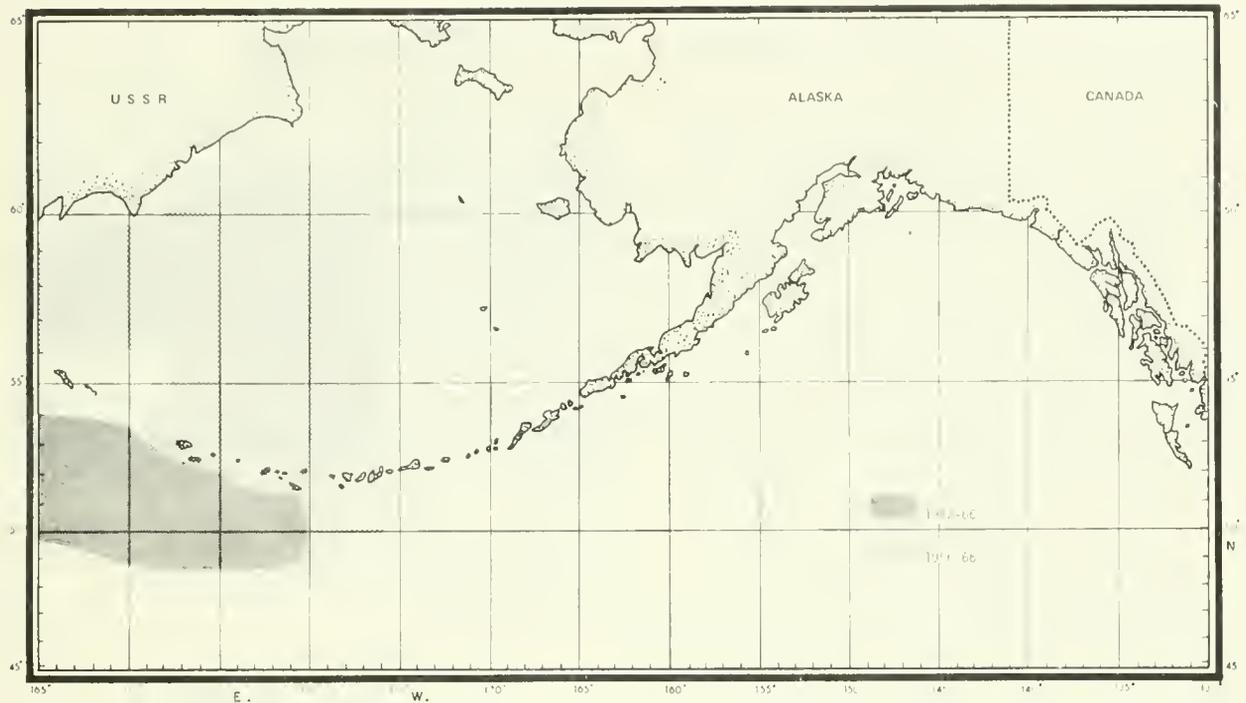


Figure 8.—Japanese high-seas salmon fishing areas.

The Japanese high-seas salmon fishery throughout the North Pacific Ocean and Bering Sea is governed by the aforementioned Convention and the Northwest Pacific Fisheries Treaty between Japan and the U.S.S.R., which regulates Japanese high-seas salmon fishing in the remainder of the North Pacific Ocean and Bering Sea between long. 175° W. and the Soviet coast. A provision of the latter treaty places a quota on the annual Japanese high-seas salmon catch. This quota is renegotiated each year.

The Japanese high-seas salmon fishery in postwar years has been marked by an expansion of the fishing area and fluctuations in the number of vessels and the catch. The fishery in 1952-55 took place in the North Pacific Ocean from off the Soviet coast to south of the western Aleutians as far east as the 180th meridian (International North Pacific Fisheries Commission, 1953-56). In 1956 the fleets moved farther east toward the INPFC provisional line at long. 175° W. and also moved north into the Bering Sea. Each year since 1956, this fishery has been active in that broad area in the North Pacific Ocean and the Bering Sea (International North Pacific Fisheries Commission, 1957-61, 1962a, 1963a, 1964, 1965a, 1966a, and 1967). Fishing begins about mid-May and lasts until July or August. Early in the season, the fleets are usually concentrated south of the western and central Aleutian Islands, frequently near the provisional line. After a few weeks, they begin dispersing into the Bering Sea and westward in the North Pacific Ocean toward the Soviet coast. By late in the season, the fleets are well scattered in these areas. The number of vessels increased from 3 factory ships and 57

catcher vessels in 1952 to 16 factory ships and 506 catcher vessels by 1956 and then decreased to 11 factory ships and 369 catcher vessels by 1962—a level that has been maintained since. The annual catch increased from 2.0 million salmon in 1952 to a peak of 60.3 million in 1957 and by 1966 had decreased to 19.2 million (table 5).

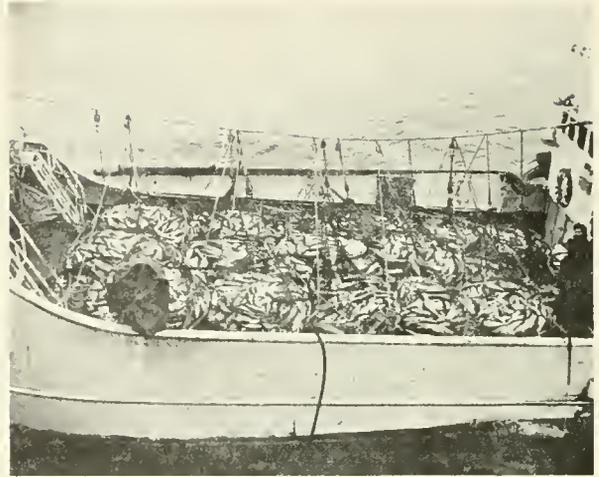


Japanese salmon factory ship with gill net vessels alongside. Each day a fleet of about 30 gill net vessels delivers its catch to a factory ship for processing.

Table 5.—Numbers of vessels and numbers of salmon caught in Japanese high-seas salmon fishery, 1952-66<sup>1</sup>

Year	Factory ships	Catcher boats	Salmon in catch
	Number	Number	Millions
1952	3	57	2.0
1953	3	105	7.7
1954	7	205	20.5
1955	14	406	64.1
1956	16	506	52.1
1957	16	461	60.3
1958	16	460	49.7
1959	16	460	42.4
1960	12	410	26.5
1961	12	410	22.7
1962	11	369	19.7
1963	11	366	23.5
1964	11	379	21.9
1965	11	369	23.8
1966	11	369	19.2

<sup>1</sup>International North Pacific Fisheries Commission, 1953-61, 1962a, 1963a, 1964, 1965a, 1966a, and 1967.



Japanese high-seas gill net vessel with deck load of salmon for delivery to a factory ship. The salmon have been separated by species and placed in net bags for rapid offloading.



A bag of salmon being taken aboard a Japanese factory ship. Each bag is weighed, and the gill net vessels are paid on a species and poundage basis.



Gill net being brought aboard Japanese high-seas salmon vessel. Each day about 9 miles of gill net is set and lifted by each Japanese high-seas gill net vessel.

Most of the salmon caught by Japanese on the high seas are of Asian origin; some salmon of North American origin are also taken each year. North American fish of Bristol Bay origin are particularly vulnerable to capture by the Japanese on the high seas. These fish migrate to the west of the provisional line and are found intermingled with salmon of Asian origin. These are both mature fish destined to return to Bristol Bay in the year

taken and immature fish destined to return in following years. The estimated numbers of Bristol Bay sockeye salmon taken by the Japanese have varied from a low of about 400,000 of the 1952 and 1953 returns to a high of 9,700,000 of the 1957 return. The smallest estimated portion of the total Bristol Bay return of sockeye salmon taken by the Japanese was 2.3 percent of the 1952 return, and the largest portion was 44.7 percent of the 1957 return (table 6).

According to Neo (1963), in order to coordinate the activities of the salmon fleets and to prevent loss of efficiency through gear interference, the Fishery Agency has divided the high seas north of lat. 40° N. into 196 blocks or squares. These blocks measure about 50 miles (east-west) by 60 miles (north-south). Each fleet,

Table 6.—Estimated total number of sockeye salmon destined to return to Bristol Bay and the estimated number and percentage of Bristol Bay sockeye salmon caught by Japanese on the high seas, 1952-66<sup>1</sup>

Year	Total sockeye salmon to return to Bristol Bay	Japanese catch of Bristol Bay sockeye salmon	Percent of Bristol Bay sockeye salmon caught by Japanese
	Millions	Millions	Percent
1952	17.4	0.4	2.3
1953	10.6	0.4	3.8
1954	7.8	0.6	7.7
1955	7.3	1.9	26.0
1956	30.3	2.8	9.2
1957	21.7	9.7	44.7
1958	8.0	1.4	17.5
1959	15.3	1.2	7.8
1960	42.6	5.2	12.2
1961	26.3	7.4	28.1
1962	12.3	1.4	11.4
1963	8.6	1.3	15.1
1964	13.4	1.4	10.4
1965	63.0	8.0	12.7
1966	21.9	2.0	9.1

<sup>1</sup>The Japanese catch of Bristol Bay sockeye salmon for 1952-65 was derived from table 3, page 9 of Ossiander, 1966. The Japanese catch for each year includes the mature fish shown for that year plus the immature fish shown for the previous year. The 1966 catch of Bristol Bay sockeye salmon was taken from page 10 of Ossiander, 1967. The above figures therefore represent the total Japanese catch from each year's Bristol Bay return rather than the annual Japanese catch of Bristol Bay salmon.

consisting of a factory ship of 7,000 to 11,000 gross tons and 25 to 35 drift gill net fishing vessels of 85 to 95 gross tons, is generally assigned one or two blocks in which to fish at any given time. Only one fleet at a time is permitted to fish in a single block or square.

Each day the catcher boats set and retrieve the gill nets and deliver their catches to their respective factory ships for processing. The drift gill net carried aboard each of the catcher boats is 9.3 miles long. The gill net vessels begin to lay their nets about midafternoon, and generally all gear is in the water by dark. After the gear is set, the vessels return to the leeward end of the nets where they drift until the next morning when the nets are lifted (Neo, 1963). Most of the salmon is canned and some are frozen aboard the factory ships and transported to Japan by cargo and supply ships. Most of the canned salmon is exported, principally to the United Kingdom.

### CHUKCHI SEA SALMON FISHERY

Japan's fisheries off Alaska were expanded into the Arctic Ocean in 1966. The Fishery Agency licensed one gill net vessel to fish salmon experimentally in the Chukchi Sea. This area is outside the INPFC treaty area and, therefore, Japanese salmon fishing in that area is not subject to the controls of that agreement.

The fishery began on July 1 when the single vessel arrived in the Chukchi Sea. Weather and sea conditions during July and the first part of August were said to be better than expected and allowed routine fishing. The fishery ended in late August when fishing became less productive, weather and sea conditions deteriorated, and supplies began to run short. The total catch was over 92 tons and consisted of almost 99 percent chum salmon. Most of the catch was salted, although a few tons were frozen.

### WHALING

The Japanese started whaling from shore bases in coastal waters of their home islands. During the rapid industrial growth and expansion of the Japanese economy at the turn of the century, modern whaling techniques, largely developed by the Norwegians, were introduced from Europe. Japanese whaling rapidly expanded in overseas areas, and large expeditions began hunting in the Arctic and the Antarctic in the 1930's. World War II brought a temporary end to Japanese whaling (U.S. Fish and Wildlife Service, 1947 and 1948).

The Japanese resumed whaling in the western North Pacific and western Bering Sea in the 1950's. Two whaling fleets worked progressively east along both sides of the Aleutian Islands in 1959, and in 1962 whaling expanded into the Gulf of Alaska (fig. 9). Each year since then three whaling fleets (each with a factory ship, seven to eight whale killer vessels, and a few support ships) have operated in the North Pacific Ocean and Bering Sea. The number of whales killed in the North Pacific increased from 3,352 in 1959 to 6,474 in 1966 (table 7).



Salmon being cleaned aboard a Japanese factory ship. After being weighed, the salmon are graded and put into bins. The better quality salmon are frozen whole, and the remaining fish are cleaned (gutted and gilled) and canned.

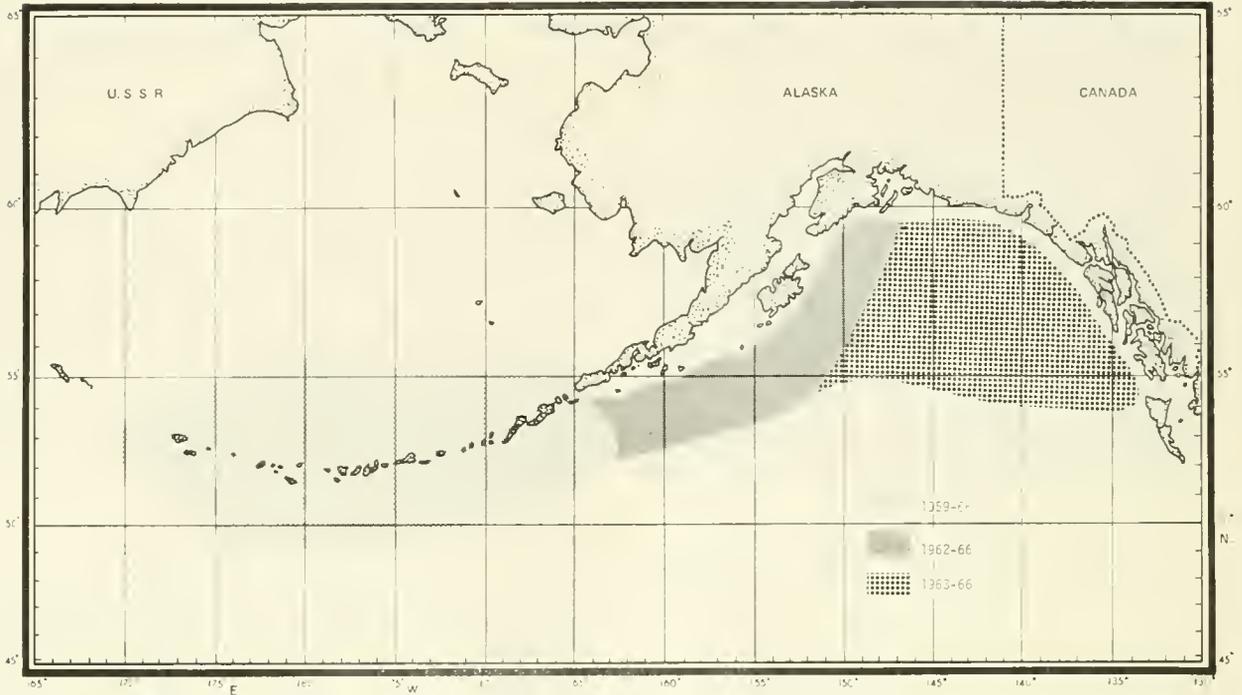


Figure 9.—Japanese whaling areas.



Japanese whale factory ship off Alaska. Japanese whale factory ships in the North Pacific are accompanied by 8 to 12 killer vessels and about 3 refrigerator vessels and tankers. These fleets range throughout the Gulf of Alaska and Bering Sea.



Japanese whale killer vessel hunting in the Gulf of Alaska. Killer vessels hunting for whales range many miles from the factory ship. The whales are killed by harpoons shot from guns on the bow of the killer vessels, inflated with air, and buoyed with radar reflectors or radio transmitters for retrieval by the factory ships.



Preparing sperm whale for butchering on deck of Japanese whale factory ship. Flensing knives are used to cut meat and blubber into strips for removal from carcass.



Final stages of whale butchering on Japanese whale factory ship. After the whale has been completely stripped, the large strips of blubber are cut into smaller pieces and sent below deck for rendering into oil. Meat is frozen for human food or animal feed. The bones are sawed into pieces for reduction to meal, and only the entrails are discarded. It takes less than 15 minutes to completely butcher a whale.



Stripping sperm whale on Japanese whale factory ship. Strips of meat and blubber are pulled off the whale by a cable on a steam-driven winch.

Table 7.—Japanese North Pacific whale harvest, 1959-66<sup>1</sup>

Year	Blue	Fin	Humpback	Sei	Sperm	Right	Total
	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
1959	70	1,450	0	32	1,800	—	3,352
1960	70	1,393	0	203	1,800	—	3,466
1961	70	1,452	9	4	1,800	<sup>2</sup> <sub>3</sub>	3,338
1962	48	1,166	17	260	2,549	<sup>2</sup> <sub>3</sub>	4,043
1963	57	1,045	10	945	2,700	<sup>2</sup> <sub>3</sub>	4,760
1964	42	1,007	0	1,533	2,461	—	5,043
1965	49	1,406	40	1,398	2,460	—	5,353
1966	—	1,256	—	2,208	3,000	—	6,464

<sup>1</sup>Norsk Hvalfangst-Tidende (1965 and 1966).

<sup>2</sup>Taken for research.



Half-stripped sperm whale on Japanese whale factory ship. All the blubber and meat are removed from whale; only the bones and entrails are left.

Whaling usually began in May, and the fleets worked easterly along the Aleutian Islands. By late June or early July, it extended into the Gulf of Alaska. The fleets began withdrawing to the west in August, and they returned to their home ports in September or October. In the early 1960's whaling was often conducted near the Alaskan coasts, but in 1964 the pattern changed and since then most of the whaling has taken place well offshore.

High-speed killer vessels hunt both in close proximity and at a distance from their respective factory ships. Whales are killed by harpoons fired from guns mounted on the bows of the killer vessels. Whales killed near a factory ship are usually taken directly to the ship, although some are filled with air, marked with flags, and later retrieved by the factory ship. Vessels hunting a great distance from the factory ship inflate the whales

and attach a radar reflector, or a radio signal transmitter, or both to help the factory ship locate their kills.

The huge factory ships are equipped with complete processing facilities. The whales are taken aboard via a stern ramp, and the blubber and meat are stripped on the main deck. In the processing areas below decks, the meat is frozen for human and animal feed, oil is extracted from the blubber, vitamin A is extracted from the liver, and bones are ground into meal.

### LONGLINE FISHERY

The Japanese longline fishery off Alaska (fig. 10) has been far smaller than the other Japanese fisheries. It has included halibut expeditions in 1963 and 1964 (the latter being very brief) and a small-scale fishery for sablefish since the early 1960's.

The 1953 International North Pacific Fisheries Convention described earlier further provided that Japan abstain from fishing for halibut of North American origin. This prohibited Japan's entrance into the halibut fishery along the Aleutian Islands, in the eastern Bering Sea, and in the Gulf of Alaska. In 1962 the Commission established under the Convention determined that the eastern Bering Sea halibut no longer met the qualifications for "abstention" under the terms of the Convention. The 10-year ban on the taking of halibut by Japanese in the eastern Bering Sea was lifted in May 1963. Five Japanese factory ships accompanied by 66 longline vessels engaged in the eastern Bering Sea halibut fishery from May into September 1963; their catch



Sablefish on deck of a Japanese longline vessel in the Gulf of Alaska. The fish are headed, eviscerated, and washed on deck, and then go below deck where they are sharp frozen and stored.

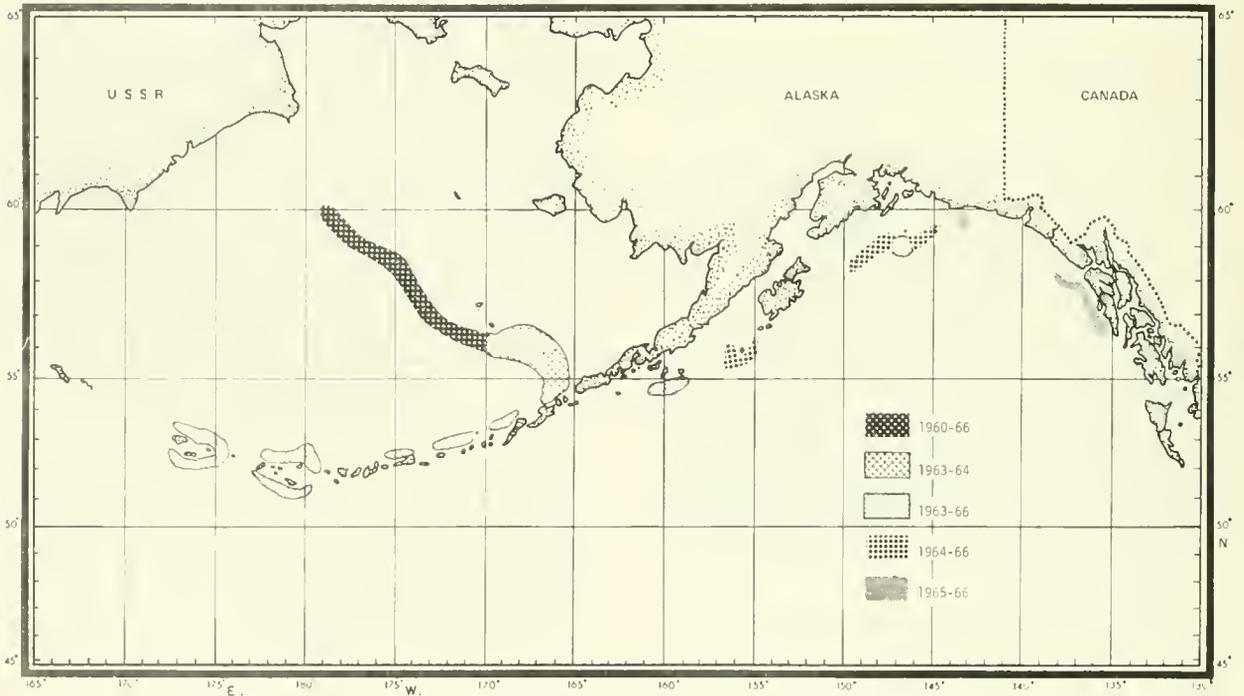


Figure 10.—Japanese longline fishing areas.

totaled 4.6 million pounds (International North Pacific Fisheries Commission, 1964). The Japanese effort was reduced to two factory ships and six longline vessels in 1964. They began fishing when the season opened on March 25 and within a few weeks, because of poor catches, shifted emphasis to fishing for sablefish. The 1964 catch of halibut by Japanese longliners in the eastern Bering Sea was only 261,000 pounds (International North Pacific Fisheries Commission, 1965a).

The longline fishery for sablefish was confined to the central and eastern Bering Sea in the early 1960's and was extended into the Gulf of Alaska in late 1963. It has been a small-scale fishery involving no more than six vessels at any given time. The vessels operate as independent units which freeze their own catches and remain on the grounds for 1 to 3 months. Upon achieving maximum cargoes of up to 3 tons, they return to their home ports.



Japanese longline vessel fishing for sablefish in the Gulf of Alaska. Japanese longliners in the Gulf operate as independent units, fishing and processing their own catches until fully loaded, and then returning to Japan.

## SOVIET FISHERIES

The Soviet Union has become a dominant power in world fishing in the last 10 years. During this period, the Soviets have acquired fleets of ultramodern fishing, processing, and support vessels; Soviet fisheries have been expanded from inland and local coastal waters to all oceans of the world; and the annual Soviet landings have increased from 2.9 million tons<sup>3</sup> (Bouchard, 1964) to 5.9 million tons (Lyles, 1968). Further growth of Soviet fisheries is signified in the current 5-year plan which would raise the annual catch to 9.6 million tons by 1970.

Of increasing importance to this tremendous growth have been fishery resources of the vast Continental Shelf off Alaska, exploited by the Soviet Far East Fishery Administration. The Soviet Far East is an economic region encompassing the coastal Siberian provinces along the Pacific Ocean. Fishing has become the most important industry in this region (Kravanja, 1964) and in 1965 accounted for nearly 35 percent of the total U.S.S.R. fishery landings. The Far East is divided into six administrative provinces. The headquarters for the Far East Fishery Administration is in Vladivostok, and subordinate units are located in the provinces.

Fishing in Russia during czarist days was principally from shore in small sailing or rowing craft, but after the 1917 Revolution the Communist regime began expanding and mechanizing the Soviet fishing fleet (Shparlinskii, 1959). The Far East began operating its first large trawlers in 1929, but growth of the fisheries

was slow prior to World War II and all operations were close to the Siberian coast. After the war, the Soviets reexamined their fisheries and began a program of large capital investment in standardized vessel construction, utilizing proven fishing and support vessel designs. Soviet shipyards were expanded to meet increased requirements. It quickly became evident, however, that they could not keep pace with the construction needs, and contracts were granted outside the U.S.S.R. to shipyards in Denmark, Finland, France, the Netherlands, Poland, Sweden, Japan, the United Kingdom, East Germany, and West Germany (Borgstrom, 1965).

The 5-year plans for 1946-50 and 1951-55 allocated to the Far East region nearly 35 percent of the total Soviet investment in the fishing industry--of the \$1.3 billion provided during that 10-year period, the Far East received \$461 million. The 7-year plan for 1959-65 showed a striking increase in capital investment; \$2.2 billion was allocated to the entire Soviet fishing industry. By the end of that period, the Far East received \$728.7 million, or 33 percent of the total (Kravanja, 1964). As a result, the Far East acquired large numbers of modern trawlers and support vessels capable of extended operations in distant waters. The Soviet fisheries in the Pacific thus had a major transformation.

The Far East fisheries grew rapidly in respect to both area and landings. As late as 1950, Soviet fishing areas were principally in coastal and inshore grounds. Only 36 percent of all Far East landings were taken from distant areas. Within 10 years, however, distant-water fisheries had become the major producers and in 1960 accounted for 80 percent of all Far East landings (Mairova and Vagner, 1965). Landings by the Far East fleets increased from about 407,000 tons (Kravanja, 1964) in 1950 to over 2 million tons in 1965--an amount equivalent to

<sup>3</sup>Quantities in the Soviet section of the report which have been taken from cited references have been converted from metric tons to short tons.

the total United States landings in 1966. The current 5-year plan for the Far East envisions an annual catch of over 4 million tons by 1970.

Soviet Far East fishing fleets first appeared off Alaska in 1959, following exploratory work in the Bering Sea in the preceding 2 years (Lipanov and Shestopalov, 1961). During the first few years, fishing was limited to the eastern Bering Sea, but in 1962 it expanded into the Gulf of Alaska and in 1963 along the Aleutian Islands. By the end of 1963, the Soviet fleets were engaged in year-round operations along much of Alaska's vast coastline. As many as 100 vessels were involved at one time. Between 1959 and 1966 over 800 individual Soviet fishing and associated support vessels operated off Alaska.

Soviet fishing activities off Alaska (fig. 11) include trawling for groundfish and shrimp, tangle net fishing for king crab, and whaling. Vessels in these fisheries include three types of side trawlers (125-178 feet long),<sup>4</sup> one type (primarily) of factory trawler (278 feet long),<sup>5</sup>

whale killer vessels (131-209 feet long), factory and base ships, refrigerated transports, cargo ships, tankers, and tugs. Most of the vessels fishing off Alaska are from three of the Far East provinces—Primorskiy Kray, Sakhalin, and Kamchatka; the major home ports are Vladivostok, Nakhodka, Nevelsk, Khomlsk, Petropavlovsk, and Ust-Kamchatsk.

The type of trawler used most often in the Soviet Far East fisheries is the SRT side trawler. Most of these vessels lack refrigeration or other processing facilities, and they are therefore dependent upon direct support by processing ships. The SRT's are thus used in fleets centered around support ships. In an attempt to improve the capabilities of their distant-water fleets, the Soviet Union began installing refrigeration equipment in some of the SRT's in the early 1960's.

The Soviet Far East fleets have in recent years been receiving an increasing number of SRTM freezer trawlers and BMRT factory trawlers. These trawlers are larger vessels capable of processing their own catches and of

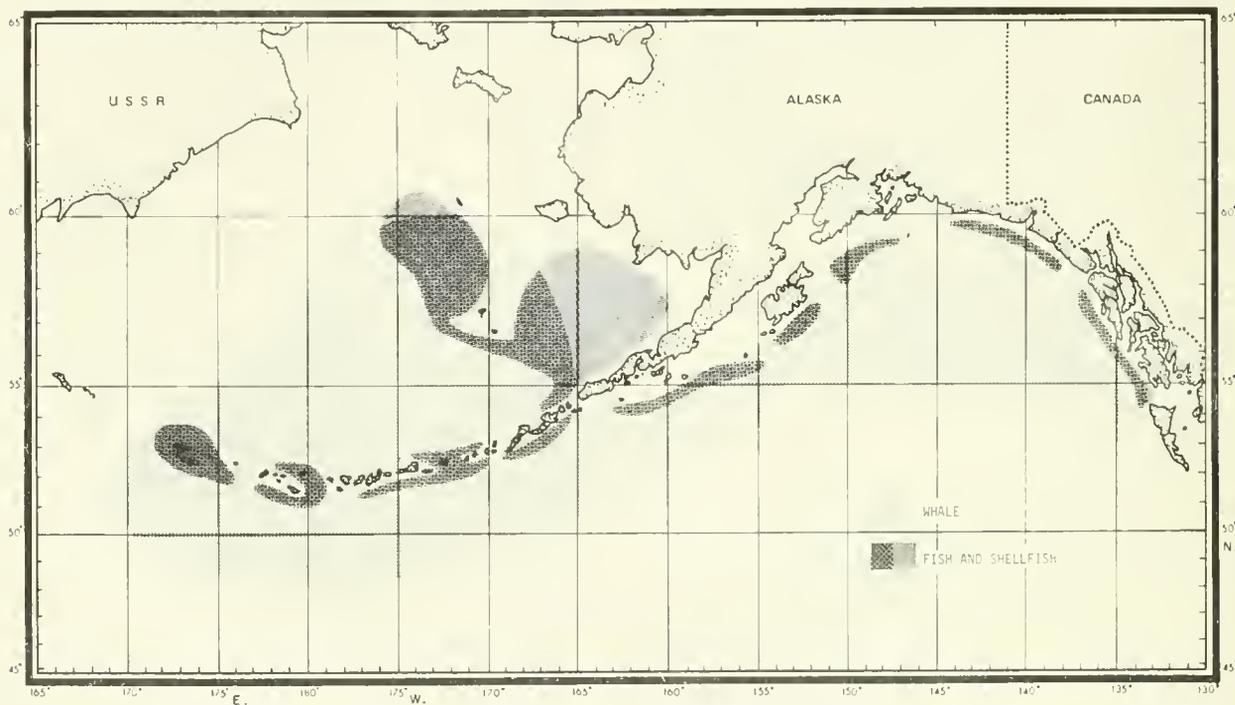


Figure 11.—Soviet fishing areas off Alaska.

<sup>4</sup>SRT—*Sredniy Rybolovnyy Trawler*, or medium fishing trawler, 265 gross tons and 125 feet long.

SRTR—*Sredniy Rybolovnyy Trawler Refrizheratornyy*, or refrigerated medium fishing trawler, 505 gross tons and 167 feet long.

SRTM—*Sredniy Rybolovnyy Trawler Morozilnyy*, or freezing medium fishing trawler, 700 gross tons and 178 feet long.

<sup>5</sup>BMRT—*Bolshoy Morozilnyy Rybolovnyy Trawler*, or large freezer fishing trawler (commonly called factory trawler), 3,170 gross tons and 278 feet long.

operating for long periods as independent units. The current Soviet program apparently envisions eventual replacement of the small dependent trawlers by the larger, more productive independent trawlers. This change of emphasis has become evident in the composition of the trawler fleets off Alaska in recent years.

The number of Soviet trawlers engaged in fisheries off Alaska dropped from 399 in 1965 to 351 in 1966. This was the first such decline in the history of these

fisheries, but despite the reduction in number there was probably no loss in fishing capabilities because the number of large processing trawlers increased. This shift to larger, more capable trawlers is reflected in figure 12, which shows the numbers and total gross tonnage of the dependent trawlers (primarily SRT's) and the independent trawlers (primarily SRTM's and BMRT's) which appeared off Alaska in 1962-66.

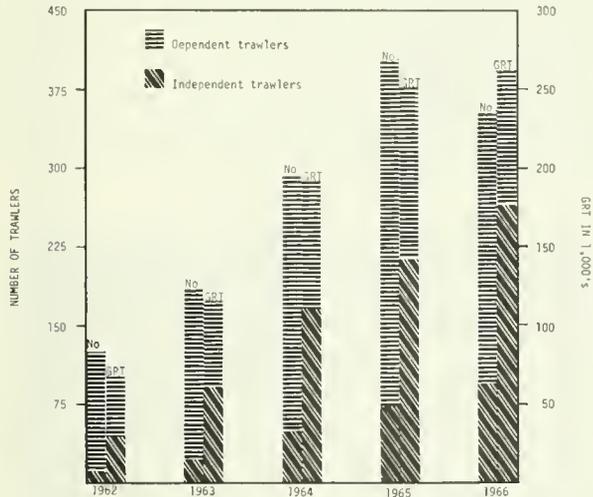


Figure 12.—Number and total gross registered tons (GRT) of Soviet trawlers off Alaska, 1962-66.

## FLOUNDER FISHERY

Intensive fishing for flounders in the Soviet Far East began in 1929-30 in waters off the Soviet coast, and this fishery soon became one of the important commercial fisheries of the Far East (Pertseva-Ostroumova, 1961). As part of its planned expansion, the Far East Fisheries Administration dispatched reconnaissance trawlers to the eastern Bering Sea in 1957-59 to search for new fishing areas. Productive flounder grounds were located, and in March 1959 Soviet trawlers began a flounder fishery on the Continental Shelf off outer Bristol Bay north of the Alaska Peninsula and south of Nunivak Island (Lipanov and Shestopalov, 1961). This fishery (fig. 13) has been active on the Bristol Bay flats each year since 1959.

The flounder fishery is a winter operation that generally begins in December or January and lasts until late April. In this report, I consider the year of the fishery to be the year in which the annual fishery ends. Each flounder expedition in 1959-63 involved about 30 trawlers supported by factory and refrigerated transport ships. The annual catch in these years was probably between 50,000 and 100,000 tons. In 1964 the flounder fleet was increased to over 40 trawlers with accompanying support ships. Although the effort was increased, the Soviets reported that the total catch was less than in previous years. In 1965 the vessels increased to 50 to 60 trawlers plus support vessels. The 1965 increase resulted in part from the shift of vessels from the herring fishery north of the Pribilof Islands which

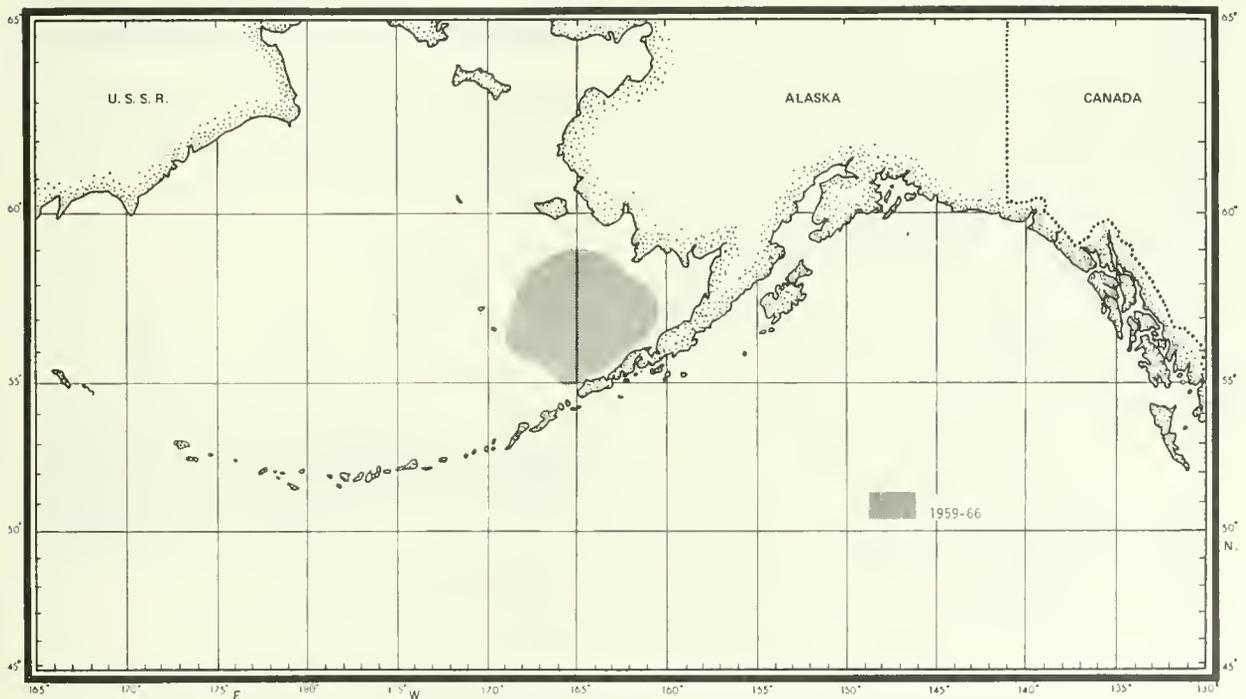


Figure 13.—Soviet flounder fishing area.



Vessels of Soviet eastern Bering Sea flounder expedition nested in the ice pack where they are protected from winter storms. Here support ships are able to transfer cargo and reprovision the Soviet fishing vessels.

ended early because of adverse weather. Soviet sources reported the 1965 flounder catch totaled nearly 90,000 tons. Intensification of this fishery continued in 1966 when 70 to 100 trawlers were active in the flounder expedition. The increase in 1966 demonstrated a shift of emphasis from the central Bering Sea herring fishery, which failed to develop, to the flounder fishery, which had proved increasingly productive. Throughout the 1966 flounder expedition Soviet sources reported that weather was favorable and that trawlers were making good catches. I estimate the the Soviets caught about 100,000 tons of flounder in the eastern Bering Sea in 1966.

The vast majority—in excess of 90 percent according to Moiseev (1965)—of catches in this fishery is composed of yellowfin sole and the most important incidental species is rock sole. Flathead sole, starry flounder, arrowtooth flounder, and juvenile Pacific halibut are known to inhabit the Bristol Bay flats, and small quantities of these species are undoubtedly caught. The fish are taken by otter trawls fished directly on the seabed. Side trawlers deliver their catches to factory ships or processing refrigerated transports, which freeze the fish for later transport to the Soviet Union. The factory trawlers in the flounder expedition freeze their own catches.

### HERRING FISHERY

In earlier years the Soviet Far East harvested large quantities of herring close to the Siberian coast. Because of intensive and irrational fishing and changing oceanological conditions that caused a reduction in populations and a decline in catches, the Far East Fisheries Administration in the 1950's began seeking new areas and concentrations of herring (Moiseev, 1962). Exploratory vessels fishing in the central Bering Sea in the late 1950's discovered commercial quantities

of herring north and west of the Pribilof Islands. In the winter of 1959-60 the Soviets conducted the first of what were to become annual herring fisheries in the central Bering Sea (fig. 14). This is a winter fishery that usually begins in December or January and extends into March or April. In this report, I consider the year of the fishery to be the year in which the annual fishery ends.

The herring expeditions in 1960-62 were composed of about 50 side trawlers and support ships. The annual catch during this period increased from an estimated 10,000 tons in 1960 to, according to Lipanov and Shestopalov (1963), over 150,000 tons in 1962. The herring fleet nearly doubled in 1963 and included about 100 trawlers plus support ships. The fishing area was extended to northwest of St. Matthew Island. I estimate the catch totaled at least 150,000 tons in 1963. The



Soviet SRT side trawler engaged in the herring fishery in the central Bering Sea. The trawlers in the herring expedition frequently seek protection from winter storms by fishing or lying along the edge of the ice pack.



Soviet SRT side trawlers nested with base ship in ice pack in central Bering Sea. Trawlers and support vessels in Soviet herring expedition rendezvous in ice pack to transfer catches and reprovision.

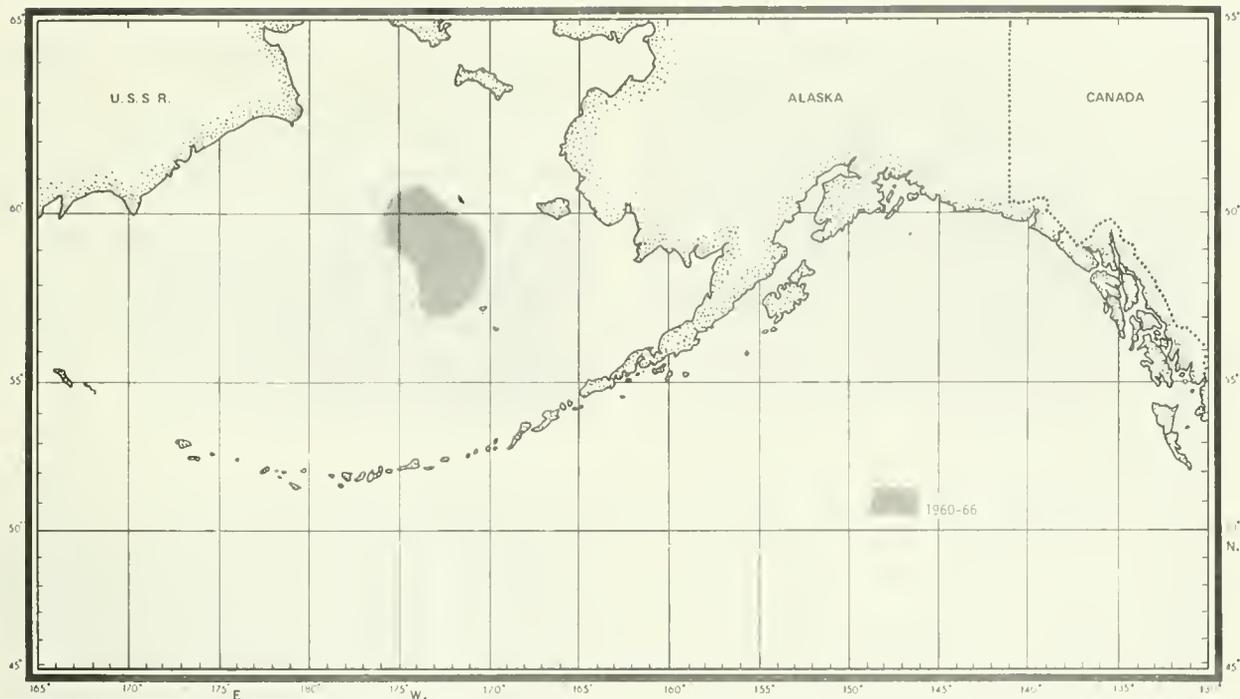


Figure 14.—Soviet herring fishing area.

fleet increased again in 1964 and had 100 to 150 trawlers and many support ships. I believe a maximum annual catch of 150,000 to 200,000 tons was achieved in 1964.

In 1965 the herring expedition showed a normal buildup and reached 100 to 150 ships shortly after the first of the year. In late February, however, this fishery was abandoned, reportedly because of adverse weather.

The size of the fishery changed drastically in 1966. In early December 1965, a small fleet of trawlers began reconnaissance fishing on the herring grounds in the central Bering Sea. By January, only about 15 trawlers and a few support vessels were active. In late January Soviet sources reported that the trawlers had not located enough herring to support a fishery, and by mid-February operations were ended. The failure of this fishery in 1966 reportedly caused economic difficulties for the Far East Fisheries because herring products were relied upon for a large margin of profit.

During the early years of this fishery, the herring were lightly salted in barrels aboard the trawlers and transferred to base ships which stored the barrels of salted herring in refrigerated holds. By 1964 the new multipurpose *Zakharov*-class factory ships began to appear in this fishery, and the trawlers then delivered their catches directly to the factory snips where the herring were lightly salted and then canned in 11-pound tins.

#### PACIFIC OCEAN PERCH FISHERY

The most extensive and perhaps the most productive Soviet enterprise off Alaska is the trawl fishery for rockfish, primarily ocean perch (fig. 15). Ocean perch, according to Rybnoe Khozyaisto (1961), is considered a valuable food fish in the Soviet Union and is marketed fresh, refrigerated, and frozen. The largest portion of the catch must be frozen or salted because the fish are caught by the distant-water fleets far from consumer markets.

The Soviet ocean perch fishery off Alaska began in 1960 when 25 to 30 trawlers fished along the edge of the Continental Shelf in the eastern and central Bering Sea (Lestev, 1961). In succeeding years, fishing expanded throughout the Gulf of Alaska, along the Aleutian Islands, and to the coasts of British Columbia and the Pacific Northwest States. In recent years, the ocean perch fleets have had nearly 200 vessels at a time.

All classes of trawlers in the Soviet Far East fish for Pacific ocean perch off Alaska. Side trawlers, primarily SRT's, are the principal type in the Gulf of Alaska, and BMRT factory trawlers are the principal type along the Aleutian Islands. The trawlers fish in areas where reconnaissance vessels have previously located large concentrations of perch. The trawls are fished just off the seabed, generally along the edge of the Continental Shelf, at depths of 80 to 150 fathoms. Side trawlers

deliver their catches fresh to accompanying processing ships which freeze the fish, primarily in the round but also dressed (headed and eviscerated). When there is a shortage of processing ships, the side trawlers (SRTM, SRTR, and some SRT's) with freezing capabilities process their own catches. Factory trawlers (mostly BMRT's) head, eviscerate, and freeze their ocean perch catches and produce fish meal and oil from the offal and incidentally caught species of nonedible fish. The frozen fish and byproducts are transferred from the processing ships and factory trawlers to refrigerated fish transport vessels for delivery to the Soviet Union. In the earlier years of the Soviet ocean perch fishery off Alaska, some of the catches were salted in barrels, but this method of processing has been abandoned in the Alaska area.

### Gulf of Alaska

In July-September 1960, an SRT side trawler on an exploratory trip in the Gulf of Alaska located large concentrations of ocean perch south of the Shumagin Islands and on Albatross and Portlock Banks off Kodiak Island (Lyubimova, 1961 and 1962). It was not until July 1962, however, that the first Soviet fleet, with about 50 trawlers and accompanying support ships, entered the Gulf of Alaska and began fishing on these two banks. This fleet, which reached a maximum strength of about 70 vessels, remained in the Gulf until December.



Soviet SRT side trawler retrieving cod end of trawl containing several tons of ocean perch in Gulf of Alaska. SRT's depend on continuous support of processing vessels.

In 1963 the fleet returned to the Gulf of Alaska in March and remained until October. Fishing began along the 100-fathom curve from Unimak Pass to south of the Shumagin Islands and later concentrated on Albatross and Portlock Banks. In 1963 the Soviets increased their fleet in the Gulf to a maximum of about 135 SRT's, 10 BMRT's, and many accompanying support ships.

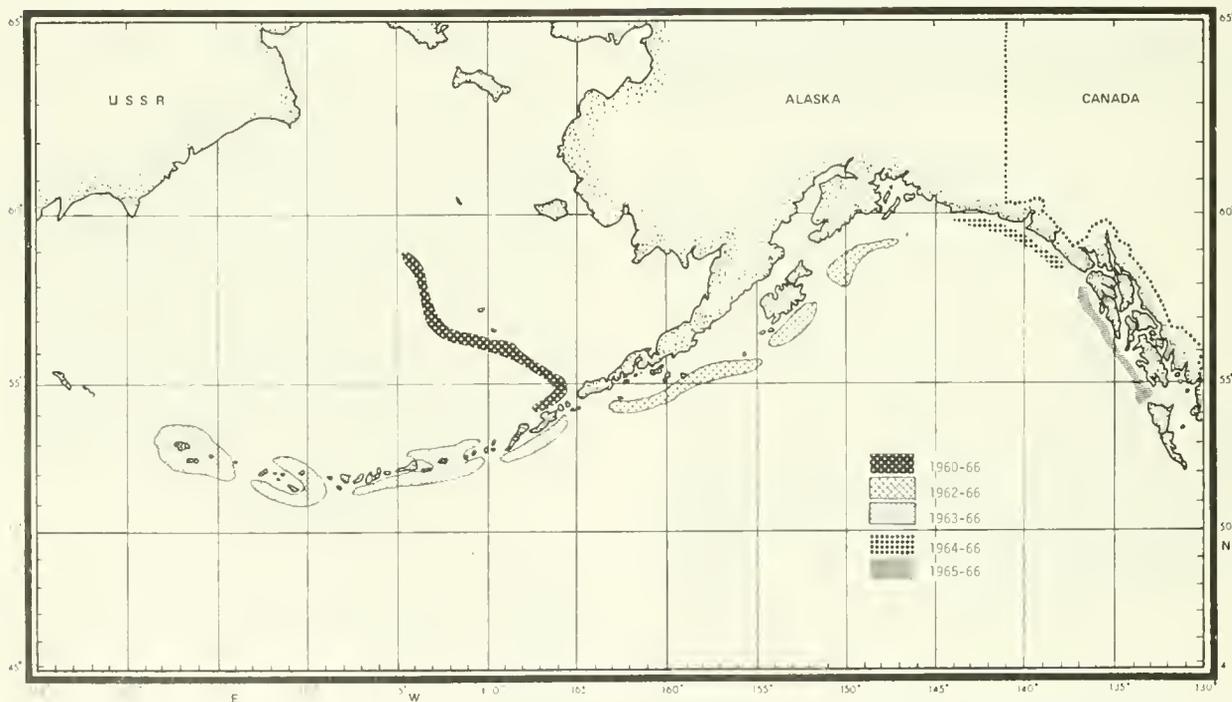


Figure 15.—Soviet ocean perch fishing areas.

Ocean perch fishing in the Gulf of Alaska in 1964 began in February. By the end of March the Soviet fishery stretched from Unimak Pass to the Yakutat grounds. A maximum fleet of about 160 vessels was reached by late May. By mid-August the number of ships had declined to about 40 vessels because many of the ships had transferred to the fisheries for saury and herring off the Soviet coast. In September the fleet was reduced to less than 30 vessels. The fleet remained at about this strength, and for the first time, a fishery was maintained in the Gulf throughout the winter. The Soviet Government reported that 230,000 tons of ocean perch were caught in the Gulf of Alaska in 1964.



Soviet fishing and support vessels nested together in Gulf of Alaska. Several classes of processing and refrigerated transport vessels accompany fleets of trawlers fishing off Alaska.



Soviet SRTR side trawler with deck load of ocean perch in Gulf of Alaska. Although this class of side trawler has freezing capabilities, catches are generally delivered directly to accompanying processing vessels.

By the close of 1965 the Soviets had established a year-round Pacific ocean perch fishery in the Gulf of Alaska and had extended the fishing area east to the coast of southeastern Alaska and into Dixon Entrance. The ships shifted frequently between productive areas across the entire Gulf. The vessels increased from about 12 in January to over 160 in May. As during the previous year, effort began decreasing in June; however, in 1965 the decline was halted in late July when 120 to 130 vessels were still fishing in the Gulf. In October and early November, the fleets had less than 100 vessels when some of the ships moved to off the coast of British Columbia. By late November those ships had returned and about 125 ships were again fishing in the Gulf at the close of 1965. The Soviets reported that their Pacific ocean perch catch in the Gulf was 340,000 tons in 1965.

From January through March of 1966, the Soviet Gulf of Alaska ocean perch fishery had a fleet of 100 to 125 trawlers and support ships, most of them off southeastern Alaska, on the Yakutat grounds, and on Portlock Bank. In April the ocean perch fleet declined to about 70 vessels because most of the ships in the eastern Gulf moved to the newly located perch and hake fisheries off the Pacific Northwest. In May the Gulf fleet rose to over 100 vessels as a result of the transfers from the recently terminated eastern Bering Sea flounder fishery. In June, however, the Gulf ocean perch fishery

was almost completely abandoned when most of the vessels moved to the coasts of British Columbia, Washington, and Oregon. In December the Pacific Northwest fisheries ended, and by the end of 1966 about 40 trawlers and several support ships were in the Gulf of Alaska.

### Aleutian Islands

The first Soviet Pacific ocean perch fishery, which was preceded by exploratory work, began along the Aleutian Islands in 1963. Up to 12 BMRT factory trawlers fished along the entire chain from August through December. This fishery continued through 1964, and BMRT's were still the mainstay. The number of vessels varied between 5 and 20, and the Soviets reported that nearly 61,000 tons of ocean perch were caught in the Aleutian Islands in 1964.

Fishing was continuous through 1965, and much of the effort was along the Near Islands in the western Aleutian Islands. In addition to 20 to 30 BMRT's and support ships, almost 10 SRT side trawlers joined this fishery about midyear and fished along the central Aleutian Islands for about 3 months. The ocean perch catch along the Aleutian Islands in 1965 increased to nearly 71,000 tons. Although this was 10,000 tons over the 1964 catch, the catch per trawler declined sharply in 1965 and the trawlers spent nearly twice as much time searching for ocean perch.

Early in 1966 Soviet vessels left the Aleutian Islands, probably because of adverse weather, and most of the trawlers transferred to the Gulf of Alaska. The Aleutian Islands ocean perch fishery was resumed by a few BMRT's in May, and by August the fleet had about 20 ships, mostly BMRT's with a few SRTM freezer trawlers. In October, however, the effort again fell when only a few BMRT's fished along the eastern Aleutians. By December the Aleutian Islands area had been vacated, which tended to corroborate continuing reports of declining catches.



Soviet BMRT factory trawler fishing for ocean perch along Aleutian Islands. This class of trawler is equipped with processing facilities and is able to operate as an independent unit.



Soviet BMRT factory trawler retrieving a trawl full of ocean perch along the Aleutian Islands. The catch is stored in bins on deck until transferred below deck to the processing facilities.

### Bering Sea

During the early 1960's the Soviets dispatched 20 to 30 trawlers each year to fish for Pacific ocean perch along the 100-fathom curve from Unimak Pass to northwest of the Pribilof Islands; however, since July 1962, ocean perch fisheries in that area have been sporadic. The Soviet Government reported the ocean perch catch in the eastern and central Bering Sea was 11,500 tons in 1964 and 9,000 tons in 1965.

### KING CRAB FISHERY

The Soviets have fished for king crabs in their own coastal waters since the early 1900's (Moiseev, 1962). The first fishing was from shore stations and then expanded to factory ships which by the late 1940's had worked nearly the entire coasts of the Sea of Okhotsk, the Kuril Islands, and the Kamchatka Peninsula.

Apparently attracted by the success of the Japanese king crab fishery off Alaska and encouraged by their own reconnaissance fishing, the Soviets began a king crab fishery on the Continental Shelf of the eastern Bering Sea in 1959 (fig. 16). The first expedition was from July into September and was made by a converted factory ship which carried eight small picker boats and was accompanied by three SRT trawlers that set tangle nets.

One factory ship fleet fished again in 1960 from April into July.

This fishery in 1961-66 was marked by modernization of the fleets and an increase in effort. A major development occurred in 1961 when two factory ships engaged in this fishery—one of which was the *Andrey Zakharov*, the first of a new class of multipurpose factory ships. Each factory ship in 1961 carried about 12 picker boats and was accompanied by 3

net setting trawlers. Two factory ships operated again in 1962, and both were of the new class. In 1963 the Soviets increased the effort to three *Zakharov*-class factory ship fleets, a level that has been maintained through 1966. Each of the factory ships carried up to 12 picker boats, and each was accompanied by 2 net-setting trawlers in 1963 and by 3 in 1964-66. Since 1964 two additional SRT's with tangle nets have conducted reconnaissance fishing for the three fleets. In 1966 the period of operations changed from April into July to early March through June.

Each year the Soviets have increased the number of tangle nets fished in the eastern Bering Sea. During the



Modern *Zakharov*-class canning factory ship used in Soviet eastern Bering Sea king crab fishery. Each factory ship carries about 12 picker boats like the 1 slung in the forward davit and the 2 alongside. Tangle nets visible on deck of the factory ships are set by accompanying trawlers.

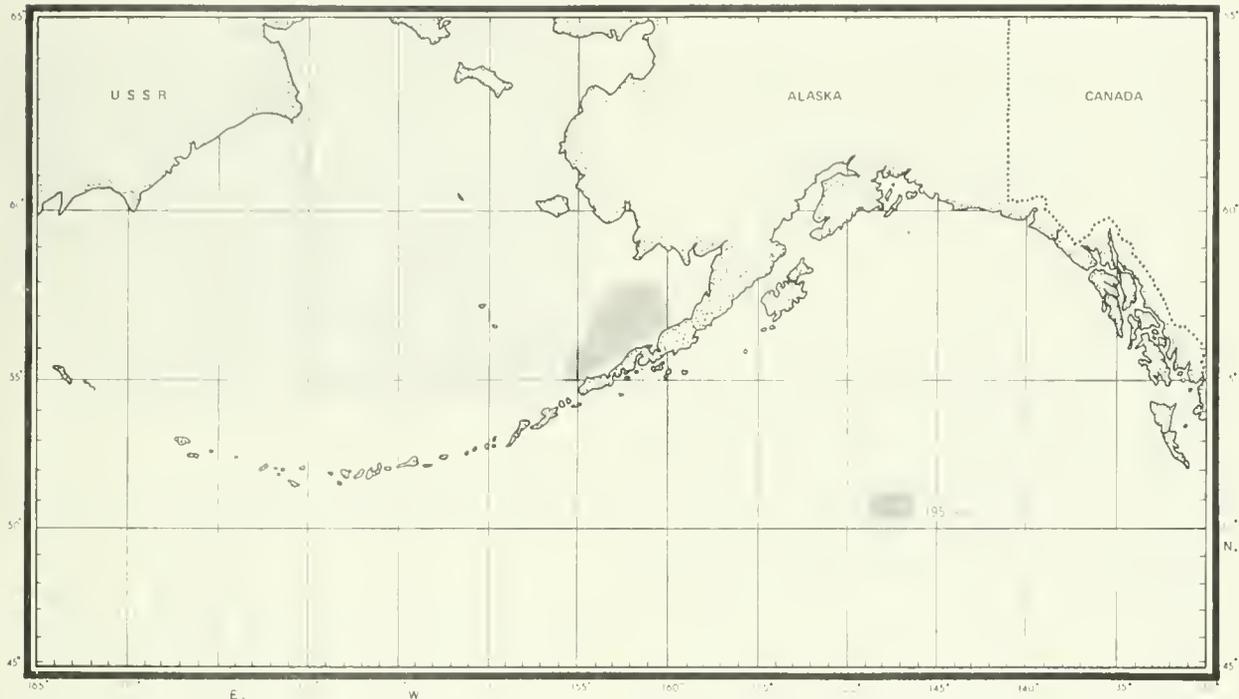


Figure 16.—Soviet eastern Bering Sea king crab fishing area.

first 3 years of the fishery the catch increased accordingly—from 620,000 crabs in 1959 to over 3.4 million crabs in 1961. In 1962 the trend reversed itself, and, in spite of annual increases in the amount of gear, the catch dropped from 3 million crabs in 1962 to just over 2.2 million crabs in 1965. In 1966, the decline halted and the catch rose to over 2.5 million crabs.

The Soviets fish for eastern Bering Sea king crabs in the same manner as the Japanese. The Soviet fishery, however, has been entirely on that area of the Continental Shelf north of the Alaska Peninsula and has not extended to the Pribilof Islands area as has the Japanese. Also, the Soviet fishery is about 2 months shorter than the Japanese fishery.

The Soviets fished for king crabs in the Gulf of Alaska on two occasions, but both of those ventures were short lived. In mid-June 1963, two crab fleets moved from the Bristol Bay flats into the western Gulf of Alaska and fished tangle nets in the Chirikof Island area southwest of Kodiak Island. The United States protested this incursion and contended that the coastal State has sovereign rights to certain natural resources (including king crabs) on the Continental Shelf beyond the limits of its territorial waters in accordance with the Geneva International Convention on the Continental Shelf—to which the U.S.S.R. was a signatory. The Soviets withdrew their crab fleets back into the Bering Sea by mid-July. Soviet officials reported that 2,200 tons of king crab were taken in the Gulf of Alaska in 1963. In April 1964 one of the Soviet crab fleets again appeared in the Gulf and fished tangle nets near Chirikof Island. The United States again protested, and the Soviet

crab fleet was withdrawn to the Bering Sea within 3 weeks. According to the Soviets, the brief 1964 fishery in the Gulf yielded 1,600 tons of king crabs.

The threat of further Soviet king crab fishing in the Gulf of Alaska was forestalled in February 1965 when the United States and the Soviet Union entered into agreement governing Soviet fishing for king crabs on the Continental Shelf off Alaska during 1965-66. The agreement, similar to the one with the Japanese,



King crab being removed from Soviet tangle nets in eastern Bering Sea. Picker boats are used to retrieve tangle nets and their catches of crab. The crab are removed from the net as it is brought aboard the picker boats and are delivered to factory ships for canning.

restricted the Soviet crab fishery to the eastern Bering Sea, placed a quota on Soviet production, and provided for certain conservation measures to be observed. The annual Soviet production quota for each of the 2 years 1965 and 1966 was established at 118,600 twenty-four-pound cases. The agreement specified that the two nations would meet prior to expiration of the agreement to decide on future arrangements.<sup>6</sup>

### SHRIMP FISHERY

The newest Soviet fishery off Alaska is that for shrimp (fig. 17). Until the early 1960's shrimp fishing by the Soviet Far East was confined to inshore waters along the Soviet coast (Kundis and Skalkin, 1962), apparently because of the lack of appropriate trawlers for shrimp fishing in distant waters. In 1962-63 the Soviets developed and began producing the *Mayak*-class SRTM freezer trawler, which proved highly suitable for distant-water shrimp fishing. Shortly thereafter the Soviets capitalized on the findings of earlier exploratory work and began catching shrimp on Alaska's Continental Shelf.

The first known Soviet shrimp fishery off Alaska was in 1963 north of the Pribilof Islands. Officers of a Japanese shrimp factory ship reported that six BMRT factory trawlers fished briefly in that area from mid-March to mid-April. Two new SRTM trawlers fished in the same area in 1964 from February until mid-June.

In late October 1964 two SRTM's entered the Gulf of Alaska and began shrimping off the southwest end of Kodiak Island. The two trawlers continued fishing in this area until early December.



Soviet SRTM freezer trawler fishing for shrimp near the Shumagin Islands in the Gulf of Alaska. The cod end of the trawl being brought aboard the SRTM has several hundred pounds of shrimp. This class of trawler has facilities for sharp freezing and refrigerated storage and has been the mainstay of the Soviet shrimp fishing fleet off Alaska.



Shrimp on deck of a Soviet SRTM freezer trawler near the Shumagin Islands in the Gulf of Alaska. After being sorted, the freshly caught shrimp pass through a rotary washer and then go below decks where they are sharp-frozen, packaged, and stored.

A major increase in the Soviet Gulf of Alaska shrimp fishery occurred in 1965 when six SRTM's resumed fishing near southwest Kodiak Island in early February. By April the fleet had increased to eight trawlers. In May the fishery shifted to the Shumagin Islands area and continued into June. The Soviets abandoned the Gulf shrimp fishery during the summer except for a brief period in late July when a few SRTM's fished near the Shumagin Islands. In early October this fishery resumed and by late October had eight trawlers. In November four of the SRTM's returned to the southwest Kodiak Island region, and by the end of 1965 five SRTM's were fishing in each of the two abovementioned areas. I estimate the Soviets caught about 8,000 tons of shrimp in the Gulf of Alaska in 1965.

Early in 1966 the fishery became centered in the Shumagin Islands area and by the end of the year had a record high number of vessels. In early February the five SRTM's fishing near the Trinity Islands joined their



Soviet SRTM freezer trawler transferring shrimp to canning factory ship in Gulf of Alaska. When shrimp are canned on the fishing grounds, they are held on deck of the SRTM trawlers and periodically delivered to a factory ship.

<sup>6</sup>In January 1967 the Agreement was extended for an additional 2 years (1967-68). The only significant change was the reduction of the Soviets' annual catch to 100,000 cases.

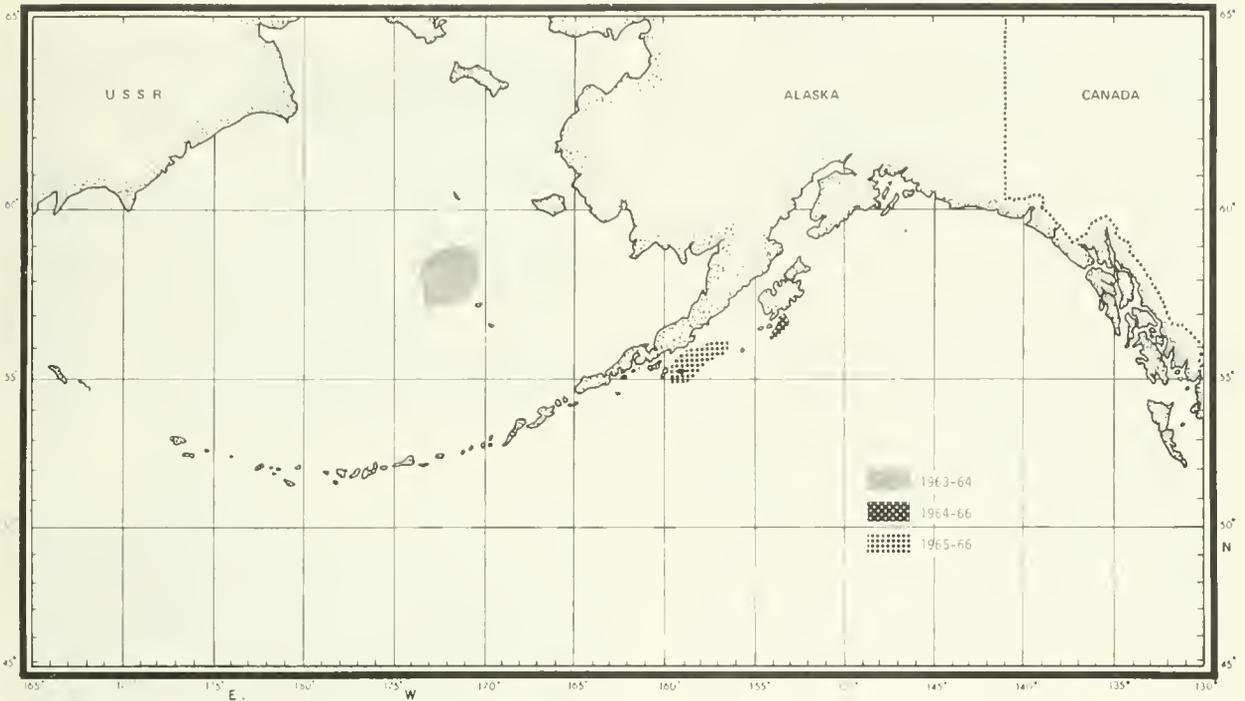


Figure 17.—Soviet shrimp fishing areas.

sisterships near the Shumagin Islands. By mid-February the fleet increased to 14 SRTM's. In mid-April the number of trawlers began decreasing, and by mid-June the fishery was discontinued. After a summer lapse, as in 1965, shrimp fishing near the Shumagin Islands was resumed in early September by 5 SRTM's; by the end of 1966, 18 trawlers were active. The Soviets caught an estimated 12,000 tons of shrimp in the Gulf in 1966.

Until late 1966 the shrimp catches were frozen in the round aboard the SRTM trawlers and subsequently delivered by refrigerated transport ships to Soviet ports. Upon arrival in the Soviet Union, the shrimp underwent final processing which was mostly by canning. In December 1966 the SRTM's were joined by a recently constructed *Zakharov*-class cannery factory ship which enabled them to completely process shrimp on the grounds.

## WHALING

Whaling in the Soviet Union began to develop successfully after the 1917 Revolution. It was begun shortly after the end of the 18th Century from shore stations, and in 1933 the first whale factory ship began operating (Syosev, 1964). This ship was an ex-United States cargo vessel which was purchased and converted to a whale factory ship by adding a stern ramp and processing equipment. Soviet whaling in the North Pacific then progressed eastward, reaching the western Aleutians by 1959 and into the Gulf of Alaska by 1962 (fig. 18).

Soviet whaling off Alaska from 1959 through 1962 was by one fleet. In 1959-61 the converted factory ship, accompanied by 9 to 15 whale killer vessels engaged in whaling along the Aleutian Islands and worked farther east each year. In 1962 the same factory ship with 19 killer vessels began whaling along the western Aleutians in April and, working eastward, entered the Gulf of Alaska by late July or early August.



Soviet whale factory ship processing whales off Alaska. Modern Soviet whaling fleets hunt whales throughout the Gulf of Alaska and Bering Sea. The meat and blubber are stripped from the whale on deck of the factory ship and then processed in the factory below deck.

The Soviets increased their emphasis on whaling in 1963 when two new modern factory ships joined the old converted factory ship. These three ships, with 46 killer vessels, began whaling along the western Aleutians in March; by August Soviet killer vessels were hunting whales throughout the Aleutian Islands and in the Gulf of Alaska. Whaling continued into September. A fourth fleet operated briefly off Alaska in 1963; it hunted whales off the Pacific Northwest and in the Gulf of Alaska while en route to Vladivostok from the Antarctic.

In 1964 the Soviet North Pacific whaling expedition lasted from March into September. One fleet worked primarily along the Aleutian Islands westward to the Siberian coast, and two fleets ranged from the north-central Bering Sea to off southeastern Alaska. Again in 1964, another fleet hunted off Alaska while en route from the Antarctic to Vladivostok. A marked difference in 1964 was that the Soviet whaling fleets remained farther offshore, rarely being sighted within 20 miles of the coast.

The same three fleets operated in the North Pacific in 1965. After they left from Vladivostok in April, the fleets apparently found good hunting in the central North Pacific and remained in that area for several weeks, because the first whaling vessels did not appear off Alaska until mid-May. It was not until June that vessels from two other fleets appeared off Alaska. The latter fleets ranged throughout the Gulf of Alaska and by mid-July had joined the third fleet along the Aleutian Islands. The three fleets operated along the Aleutians for the remainder of the expedition except for the last part

of July and about the first 3 weeks of August when one fleet hunted off the coast of southeastern Alaska. According to Soviet sources, the fleets returned to Vladivostok in November. Another fleet again hunted briefly off Alaska while en route home from the 1964-65 Antarctic whaling season.

The Soviets reported that five whaling fleets were to operate in the North Pacific in 1966. Three fleets left Vladivostok in May. One of those fleets operated along the Aleutian Islands in May, June, and July; the other



Soviet whale killer vessel hunting whales in the North Pacific Ocean. A fleet of about 12 killer vessels accompanies a factory ship. The whales are killed by harpoons shot from guns on the bow of the killer vessels.

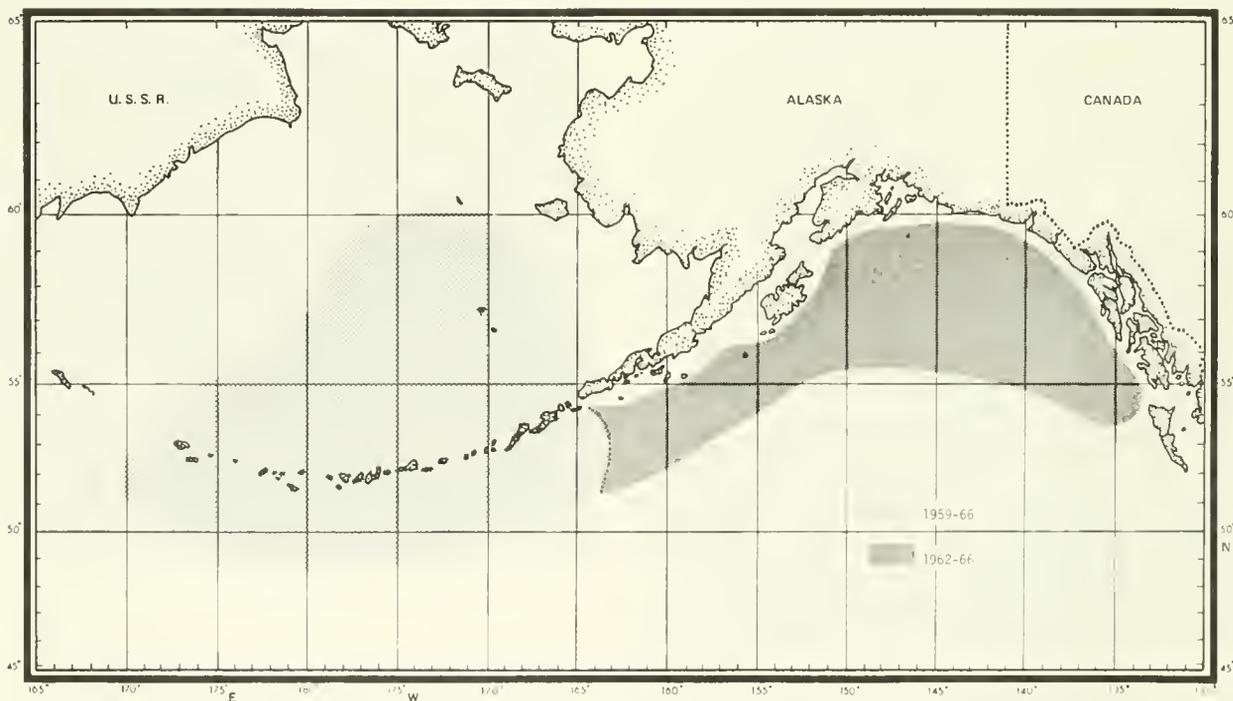
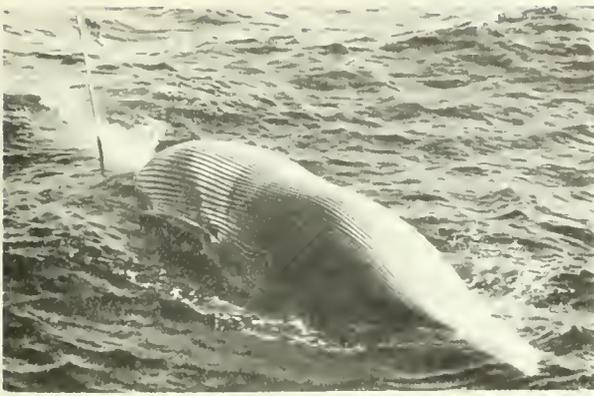


Figure 18.—Soviet whaling areas.



Fin whale killed by Soviet whale killer vessel. After the whales are killed, they are filled with air and marked with buoys, radar reflectors, and sometimes radio transmitters for pickup by factory ships.

two fleets apparently operated far offshore in the central and eastern North Pacific. In 1966, as in the previous 3 years, one fleet was to hunt whales in the North Pacific on its return to the Soviet Union from the Antarctic. In late May the Far East Fisheries Administration received another whale factory ship and announced that the ship would also operate in the North Pacific in 1966.

The number of whales killed in the North Pacific by the Soviets has increased annually, rising from 1,881 in 1959 to 12,267 in 1966 (table 8).

Table 8.—U.S.S.R. North Pacific whale harvest, 1959-66<sup>1</sup>

Year	Blue	Fin	Humpback	Sei	Sperm	Right	Total
	Number	Number	Number	Number	Number	Number	Number
1959	22	132	74	93	1,560	-	1,881
1960	-	128	57	59	2,228	-	2,472
1961	2	79	314	54	1,868	-	2,317
1962	19	438	1,213	303	1,955	-	3,928
1963	347	1,060	2,242	514	5,125	-	9,288
1964	77	2,500	242	595	5,432	<sup>2</sup> 1	8,847
1965	72	1,492	243	695	8,196	-	10,698
1966	-	1,318	-	1,510	9,439	-	12,267

<sup>1</sup>Norsk Hvalfangst-Tidende, 1965 and 1966.

<sup>2</sup>Taken for research.

## HALIBUT AND SABLEFISH FISHERY

In recent years the Soviets have remarked on the resources of halibut and sablefish off Alaska. Despite these usually optimistic reports, there is no evidence that the Soviets have developed a commercial-scale fishery

for these species. It must be borne in mind that Soviet references to halibut usually include species other than Pacific halibut, on which the long-standing United States and Canadian halibut fishery relies. Soviet references to halibut include Greenland halibut, arrowtooth flounder, and Asiatic arrowtooth flounder (Lestev, 1963, and Novikov, 1960).

There have been several fragmentary reports of Soviet exploratory trawling for halibut in the Bering Sea. According to Zakryzhevskiy and Kulikov (1963), one such venture began in February 1962 by two research trawlers which trawled at depths of 200 to 400 m. (109-382 fathoms) in the southeastern and central Bering Sea from the Krenitzin Islands near Unimak Pass to long. 174° E. Favorable trawling bottom was located and in addition to halibut, encouraging catches of yellowfin sole, sablefish, flathead sole, pollock, cod, rockfishes, and grenadiers were reportedly made.

A Japanese trade journal stated that in October 1964 the Soviets dispatched three BMRT factory trawlers to fish for halibut in the eastern Bering Sea. They were reportedly to trawl in depths of 300 m. (160 fathoms). These three factory trawlers were shortly joined by two additional BMRT's, and all five fished in the central Bering Sea well northwest of the Pribilof Islands. Their quota was reportedly to be 16,500 tons. In mid-December, two of the BMRT trawlers returned to port to unload. One of these vessels reportedly caught 165 tons of halibut and 24 tons of sablefish, and the other reportedly delivered 360 tons of halibut and sablefish. By the end of December, the other trawlers involved in this fishery began appearing in other areas, fishing for other species. It is probable that ice conditions forced termination of the fishery, and it appears doubtful that the quota of 16,500 tons was achieved.

In October 1965 Soviet sources revealed that a group of BMRT factory trawlers was to be dispatched to fish for sablefish and halibut at depths of 500 to 600 m. (250 to 300 fathoms) in the central Bering Sea. Results of this expedition were never made known.

In 1966 the Soviets continued to study the potential for a halibut and sablefish fishery off Alaska. There were frequent reports of individual research vessels conducting experimental trawling for halibut and sablefish at depths of 200 to 750 fathoms in the North Pacific and Bering Sea. Some of these vessels are known to have operated on favored halibut fishing grounds off Alaska. One SRTM freezer trawler caught 1 to 1.5 tons of halibut and sablefish per individual drag or tow in the Bering Sea during a 1-month reconnaissance expedition. Another research trawler in the central Bering Sea caught up to 9 tons of halibut and sablefish per 1-hour drag or tow in the central Bering Sea.

Administrators of the Far East fisheries have expressed the view that they prefer to keep the trawlers engaged in the proven fisheries for perch, hake, flounder, and shrimp rather than risk reequipping the vessels for a somewhat speculative deep-water trawl fishery for halibut and sablefish. It is quite conceivable, however, that as more information is gathered on deep-water trawling, the Soviets will initiate such a fishery in the Alaska area.

## SOUTH KOREAN FISHERIES

Exploratory fishing by South Korea in the North Pacific and Bering Sea in 1966 presages the entry of that nation into the fisheries off Alaska. The initiation of a groundfish trawl fishery and a high-seas salmon fishery by South Korea appears to be highly potential developments.

A vessel from Pusan National Fisheries College left South Korea in mid-July 1966, and from early August until late September conducted exploratory fishing off Alaska. The area of operations was along the Aleutian Islands, in the western Gulf of Alaska, and in the eastern

and central Bering Sea as far north as St. Matthew Island. Types of fishing included trawling for groundfish and sampling salmon on the high seas with gill nets.

It was reported that the data collected during the exploratory expedition would be analyzed by South Korea to determine the feasibility of beginning a factory ship-type fishery in the North Pacific and Bering Sea. No future plans were announced by the end of 1966, but it was reported that a South Korean official had traveled to western Europe in late 1966 and had obtained a source of financing for factory ships and trawlers.

## ACKNOWLEDGMENTS

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knowledge of the subject, suggestions, and encouragement were particularly helpful. Sid O. Morgan prepared the figures.

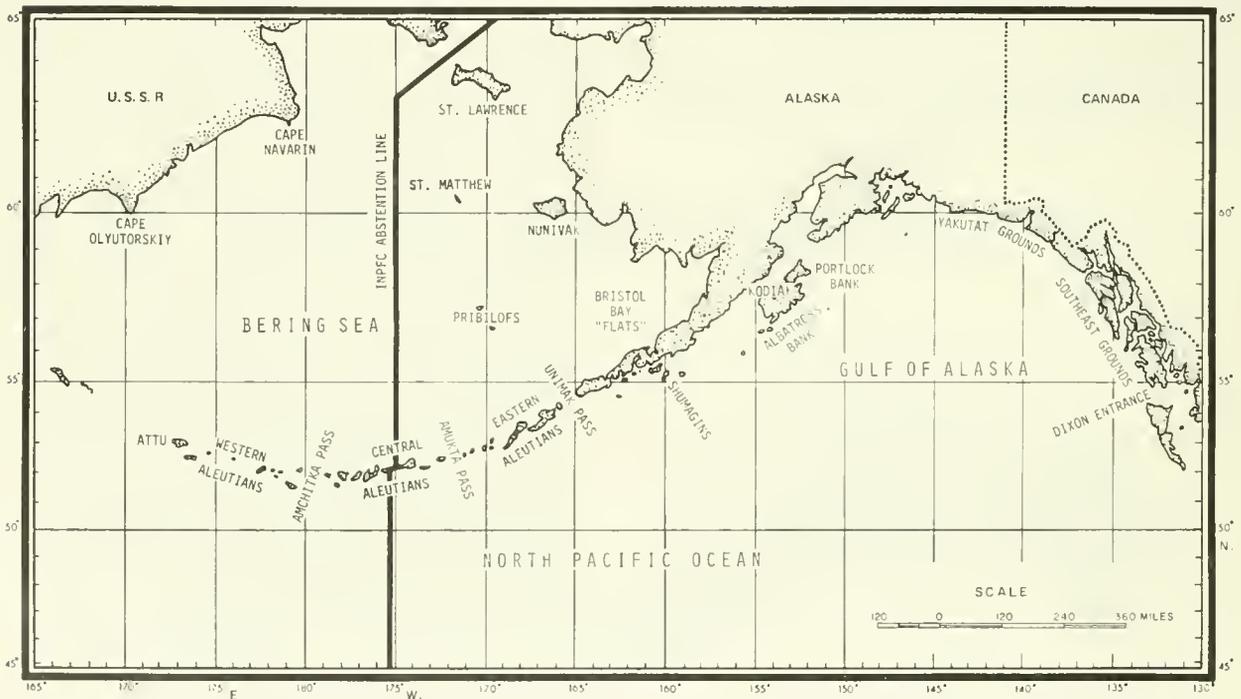


Figure 19.—Principal fishing grounds and points of reference, Alaskan area.

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