COMMERCIAL FISHERIES REVIEW

November 1964 - Supplement Washington, D. C. Vol. 26, No. 11a

SOVIET FAR EAST FISHERIES EXPANSION

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ABSTRACT

Fisheries are today the most important industry in the Soviet Far East, an Economic Region encompassing all coastal provinces between Siberia and the Pacific. This prominence was achieved with the help of a generous investment program, which has resulted in greatly increased fishery landings. From 1950 to 1963, the production of fish and other aquatic animals rose by 313 percent to 1.5 million tons, an all-time record. This increase was accelerated during the last 4 years by additions of over 200 large modern fishing, fish-transporting, and fish-processing vessels. A large whale-hunting fleet was also created. The article describes 13 recently added Soviet vessel types in considerable technical detail. Statistical tables, maps, and photographs accompany the text.

BACKGROUND

Fishing is the most important industry in the Soviet Far East (fig. 1). In 1962 the value of the gross output from the Far East fisheries amounted to nearly 1 billion rubles (US$1.1 billion[1/]). This value was almost 30 percent of the value of the total industrial output in the Soviet Far East. The Far East fisheries are today a vast complex of fishing fleets, port facilities, and shore-based processing plants served by thousands of fishermen, longshoremen, and industrial workers. All is directed by a single regional administrative body, the Main Administration of Far East Fisheries.

Increased Soviet Far East fishery landings were made possible by a generous capital investment program. Like in all other Soviet industries, overall policy and programs for the fishing industry are determined by the central government in Moscow. The five-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 $461,000,000 (table 1). The seven-year plan for 1959-65 shows a striking increase in capital investment, with $2.2 billion allocated to the entire Soviet fishing industry; by 1965 the Far East will have received $728.7 million (or 33 percent of the total). The principal beneficiary of current increased investment outlays is the Maritime Province (Primorskii Krai), situated near Mainland China. This area's annual fishery investments increased from $8.9 million allocated during the 1951-55 5-Year Plan, to $69.4 million during the current 7-Year Plan, or by almost 700 percent.

Table 1 - Capital Investment in the Soviet Fishing Industry, 1946-55 and 1959-65

Region and Province	1959-65	1951-55	1946-50
	. . . . (Millions of US$)		
Far East Region:			
Primorskii Krai	485.2	44.6	27.9
Kamchatka Oblast' . . .	150.9	101.1	54.8
Sakhalin Oblast'	79.3	97.7	55.7
Other provinces	13.3	47.6	31.4
Total Far East	728.7	291.0	169.8
Other regions	1,506.6	545.2	322.3
Total U.S.S.R. . . .	2,235.3	836.2	492.1

Note: In converting Soviet internal rubles into U. S. dollars, the so-called official Soviet conversion rate of U.S.S.R. ruble 1.00 = US$1.10 has been used.
Source: Mikhailov 1962.

FISHERY ADMINISTRATION

Until 1959, the fishing industries of the Far East administrative provinces were controlled by local Economic Councils (Sovnarkhozes), as were other Far East industries. Lack

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of centralized control led to many difficulties. Exploratory fishing efforts, for example, were duplicated by provinces. Shore processing facilities were overloaded in one province, while installations in other provinces remained idle. The Far East fishing industry was reorganized at the end of 1959, and centralized control was given to a new organization--the Main Administration of Far East Fisheries (Glavnoe Upravlenie Dal'nevostochnoi Rybnoi Promyshlennosti, usually abbreviated in Soviet writings to Glavdal'vostokrybprom). The Main Administration, located at Vladivostok, is responsible to the Council of Ministers of the Russian Soviet Socialist Republic and to the Federal Committee on Fisheries, both in Moscow. This centralization has been found so effective in increasing production, that in 1962 the Soviet Union also reorganized its European-based fisheries into four major fishery administrations.

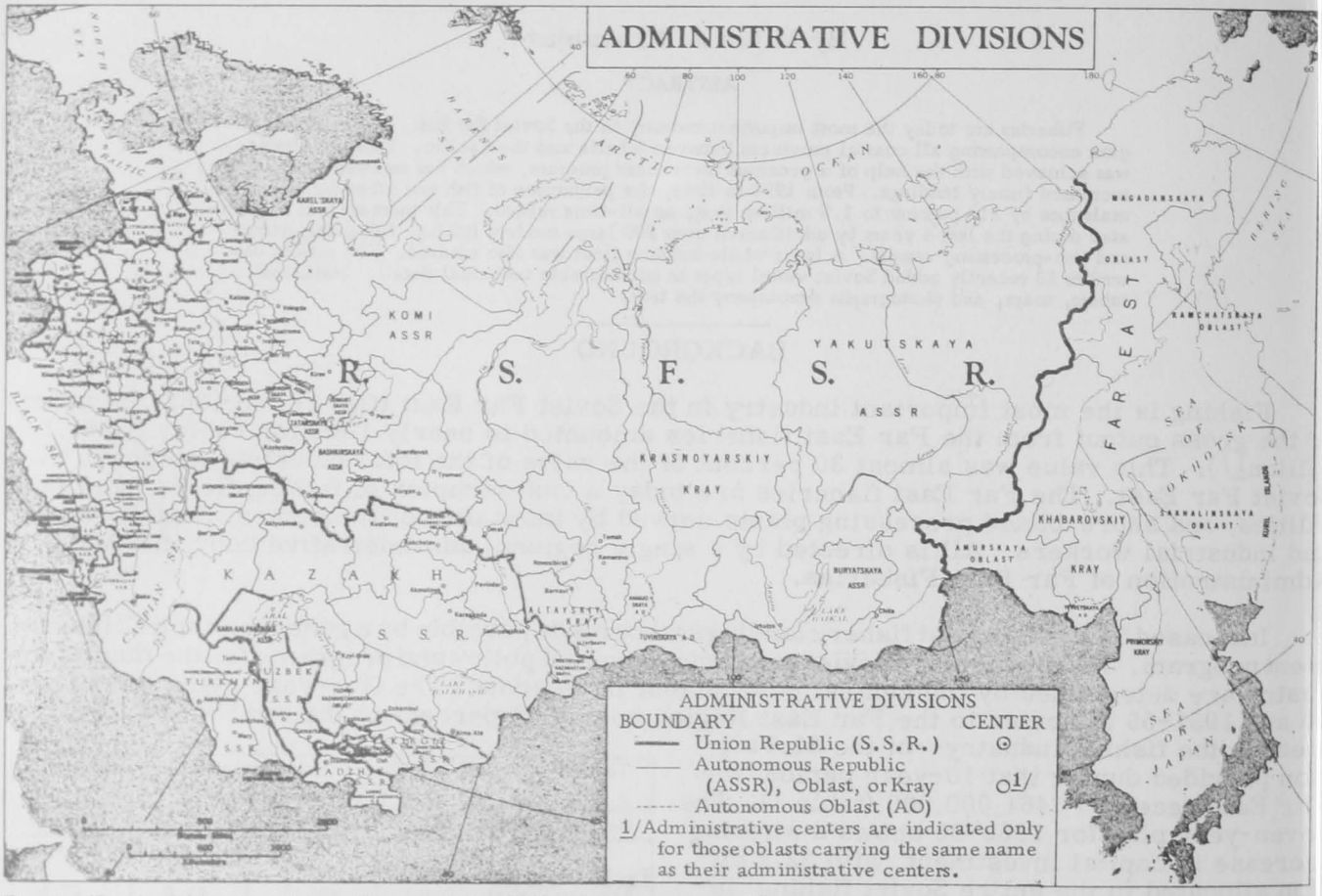

Fig. 1 - The Soviet Far East Region (Sovetskii Dalnii Vostok) is composed of 6 administrative units, 5 of which are contiguous to seas rich in fishery resources. It belongs administratively to the Russian Soviet Federative Socialist Republic (R.S.F.S.R.) which stretches from the Barents, Baltic, and Black Seas to the shores of the Sea of Japan, the Sea of Okhotsk, and the Bering Sea.

FAR EAST FISHERY CATCH

In 1963, the Far East Region produced about one-third of the total Soviet fishery landings of 4,670,000 metric tons (table 2). Official U.S.S.R. fishery statistics give a breakdown by Soviet republics, but the Russian Soviet Socialist Republic includes all major Soviet fishing areas and it is impossible to determine Far East marine landings from those figures alone. Analysis of current Soviet writings on economics, however, has supplied statistical data which are not publicly available from the Soviet Federal Committee on Fisheries (the equivalent of the U.S. Bureau of Commercial Fisheries).

Far East marine landings show significant changes since 1950, when about 370,000 tons were caught. By 1963, landings had increased fourfold to an estimated 1,530,000 tons. Soviet Far East landings have been expanding at a greater rate than total U.S.S.R. landings. In 1950

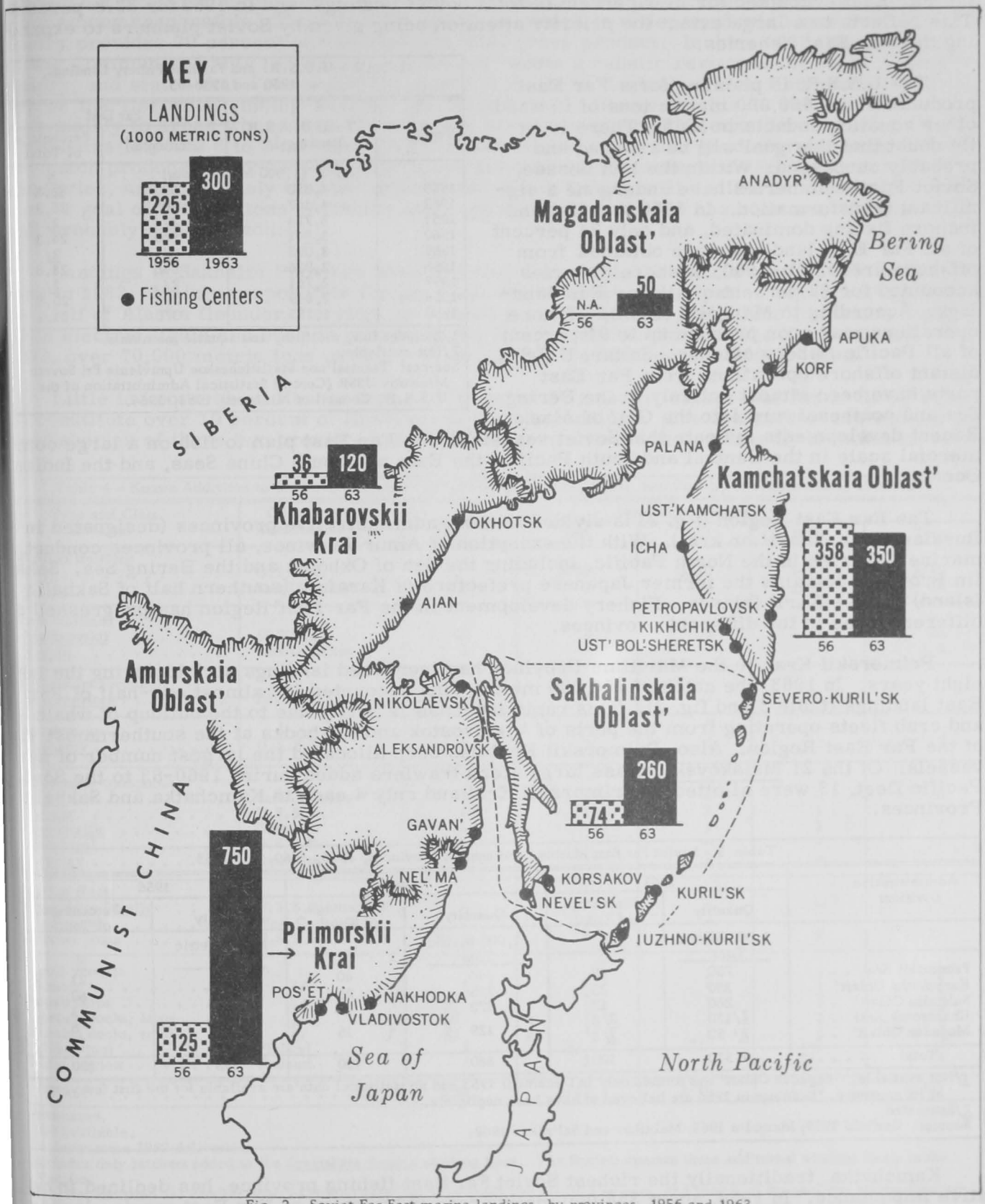

Fig. 2 - Soviet Far East marine landings, by provinces, 1956 and 1963.

the Far East accounted for 21.1 percent of total Soviet landings, and in 1963 for 32.8 percent. This reflects to a large extent the priority attention being given by Soviet planners to expanding the Far East fisheries.

The U.S.S.R. is planning for a Far East production of 1,660,000 metric tons of fish and other aquatic products in 1965. There is little doubt that this goal will be reached and probably surpassed. Within the last decade, Soviet Pacific fisheries have undergone a significant transformation. In 1950, coastal and inshore fishing dominated, and only 34 percent of all Far East landings were obtained from offshore areas. By 1960, offshore fisheries accounted for 82 percent of all Far East landings. According to Margolin (1963), offshore operations may soon produce up to 94 percent of all Pacific fishery catches. So far, U.S.S.R. distant offshore operations from Far East ports have been almost entirely in the Bering Sea and southeastward into the Gulf of Alaska. Recent developments indicate that Soviet vessels in the Far East plan to fish on a large commercial scale in the Central and South Pacific, the East and South China Seas, and the Indian Ocean.

Table 2 - U.S.S.R. and Far East Fishery Landings, 1950 and 1956-63

Year	Total U.S.S.R. Landings 1/	Far East	
		Landings 1/	Percentage of Total
	. . . (1,000 Metric Tons) . . .		%
1963	4,670	1,530	32.8
1962	4,167	1,203	28.9
1961	3,724	2/	2/
1960	3,541	860	24.3
1959	3,075	2/	2/
1958	2,936	846	28.8
1957	2,761	2/	2/
1956	2,849	593	20.8
1950	1,755	370	21.1

1/Includes fish, shellfish, and aquatic mammals.
2/Not available.
Sources: Tsentral'noe Statisticheskoe Upravlenie Pri Sovete Ministrov USSR (Central Statistical Administration of the U.S.S.R. Council of Ministers) 1963, 1964.

The Far East Region (fig. 2) is divided into six administrative provinces (designated in Russian as an oblast' or krai). With the exception of Amur Province, all provinces conduct marine fisheries in the North Pacific, including the Sea of Okhotsk and the Bering Sea. Sakhalin Province contains the former Japanese prefecture of Karafuto (southern half of Sakhalin Island) and the Kuril Islands. Fishery development in the Far East Region has progressed at different rates in the different provinces.

Primorskii Krai or the Maritime Province has increased landings sixfold during the last eight years. In 1963, the catch of 750,000 metric tons accounted for almost one-half of Far East landings (table 3 and fig. 2). This rapid increase is partly due to the buildup of whale and crab fleets operating from the ports of Vladivostok and Nakhodka at the southernmost tip of the Far East Region. Also, Primorskii Krai has been allocated the largest number of new vessels. Of the 21 Maiakovskii-class large stern trawlers added during 1960-63 to the Soviet Pacific fleet, 13 were allotted to Primorskii Krai and only 4 each to Kamchatka and Sakhalin Provinces.

Table 3 - Soviet Far East Marine Landings, by Provinces, 1956, 1960, and 1963

Administrative Divisions	1963		1960		1956	
	Quantity	Percentage of Total	Quantity	Percentage of Total	Quantity	Percentage of Total
	1,000 Metric Tons	%	1,000 Metric Tons	%	1,000 Metric Tons	%
Primorskii Krai . . .	750	49	344	40	125	21
Kamchatka Oblast' .	350	23	215	25	358	60
Sakhalin Oblast' . .	260	17	172	20	74	13
Khabarovsk Krai . .	2/120	2/ 8	{ 129	{ 15	36	6
Magadan Oblast' . .	2/ 50	2/ 3			1/	1/
Total	1,530	100	860	100	593	100

1/Not available. Magadan Oblast' was formed only in December 1953 and no statistical data are available for the first few years of its existence. Landings in 1956 are believed to have been negligible.
2/Estimated
Sources: Garfield 1959; Margolin 1963; Melnikov and Sal'nikov 1962.

Kamchatka, traditionally the richest Soviet Far East fishing province, has declined in relative importance. In 1956, about 358,000 metric tons (60 percent of Far East marine landings) were produced by that province. In 1963, production was about the same, but constituted only

23 percent of Soviet marine landings in the Far East. This has produced a certain restlessness among responsible officials of the province, which is understandable since the fishing industry provides 70 percent of Kamchatka's total gross product. In June 1963, the Secretary of the Communist Party for Kamchatka Oblast' wrote a caustic review of the local fishing industry, and stated that "one would think that it would be logical to keep Kamchatka in at the top of the list when fishing vessels are distributed. However, this is not so; they are sent mainly to areas where both landings and productivity are at a considerably lower level." Kamchatka imports 6 to 7 metric tons of industrial and consumer goods for each ton of fishery catch produced. Consequently, the central government wants to diversify Kamchatka's industries, and it is likely that the importance of her fishing will decline further. Nevertheless, a goal of 500,000 tons of fishery landings by the end of 1965 has been set, although this will probably not be reached.

Landings in Sakhalin Province have increased from 74,000 metric tons in 1956 to 260,000 tons in 1963. Mainly responsible for the increase has been participation in the Bering Sea and the Gulf of Alaska flounder, herring, and ocean perch fisheries, and intensified saury fishing (with electric lights and suction pumps) in the Northwest Pacific near the Kuril Islands. In 1963, over 70,000 metric tons of saury were landed; the 1965 goal is 200,000 tons.

Little is known about Khabarovsk and Magadan Provinces, except that Amur River salmon constitute over 10 percent of Khabarovsk marine landings. The low rate of investment in the fisheries of those two provinces is partly responsible for the reportedly nominal increase

Table 4 - Known Additions to the Soviet Far East Fishing Fleet, by Type, Class, and Country of Construction, 1960-63

Type and Class of Vessel	Country of Construction	Number of Vessels				
		1963	1962	1961	1960	Total
Medium trawlers:						
SRT	U.S.S.R.	2/	1/20	1/10	1/10	1/40
Okean	East Germany	4	3	4	3/ 5	16
Stern trawlers:						
Maiakovskii	U.S.S.R.	12	3	4	2	21
Tropik	East Germany	1	-	-	-	1
Motherships (herring):						
Severodvinsk	Poland	-	2	2	1	5
Factoryships:						
Zakharov	U.S.S.R.	2	1	1	1	5
Refrigerator transports:						
Bratsk	East Germany	1	3	4	-	8
Tavriia	U.S.S.R.	-	1	2	1	4
Pervomaisk	Denmark	-	-	1	1	2
Sevastopol	U.S.S.R.	2	1	-	-	3
Skryplev	Denmark	2	1	-	-	3
Whaling fleet:						
Sovetskaia Rossiia	U.S.S.R.	-	1	-	-	1
Vladivostok	West Germany	2	-	-	-	2
Catcher boats	U.S.S.R.	4/ 3	7	13	4	27
Support vessels:						
Tankers	2/	1	1	2	1	5
Repair ships	2/	2/	1	-	1	2
Floating docks, large	2/	2/	1	1	-	2
Floating docks, small	2/	2/	1	1	1	3
Salvage tugs	Finland	1	2/	2/	2	3
Water carriers	Finland	1	2	1	2/	4
Total		1/32	1/49	1/46	1/30	1/157

1/Estimated.
2/Not available.
3/Includes some 1959 deliveries.
4/Includes only catchers added to the Sovetskaia Rossiia whaling fleet. The Soviets operate three additional whaling fleets in the Pacific.
Note: Not included are smaller types of fishing craft, such as small and medium seiners, and vessels of the seal and walrus-hunting fleet.

in landings. From 1959 through 1965, the U.S.S.R. will have invested only the equivalent of US$13.3 million in the Magadan, Amur, and Khabarovsk Provinces. This is barely 0.6 percent of the total Soviet investment in the Far East fisheries (table 1).

FAR EAST FISHING FLEET

Increased Far East landings are mainly the result of an unprecedented growth in the Soviet Pacific fishing fleet. During 1960-63, the Soviet Government supplied the Main Administration of Far East Fisheries with over 200 modern fishing and support vessels--an estimated 500,000 gross tons. Data have been compiled from many sources on specific details regarding 157 of the larger vessels, totaling 410,020 gross tons. Table 4 gives the type and class of vessels built, the country of construction, and the year when the vessels were added to the Far East fleet. Table 5 gives the average and total gross tonnages of the new vessels.

Table 5 - Known Additions to the Soviet Far East Fishing Fleet, by Type, Class, and Gross Tonnage, 1960-63

Type and Class of Vessel	Average Gross Tonnage	Total Gross Tonnage				
		1963	1962	1961	1960	Grand Total
Medium trawlers:						
SRT	260	2/	1/5,200	1/2,600	1/2,600	1/10,400
Okean	505	2,020	1,515	2,020	2,525	8,080
Stern trawlers:						
Maiakovskii	3,170	38,040	9,510	12,680	6,340	66,570
Tropik	2,600	2,600	-	-	-	2,600
Motherships (herring):						
Severodvinsk	10,000	-	20,000	20,000	10,000	50,000
Factoryships:						
Zakharov	12,675	25,350	12,675	12,675	12,675	63,375
Refrigerator transports:						
Bratsk	2,500	2,500	7,500	10,000	-	20,000
Tavriia	3,230	-	3,230	6,460	3,230	12,920
Pervomaisk	3,300	-	-	3,300	3,300	6,600
Sevastopol	5,525	11,050	5,525	-	-	16,575
Skryplev	4,700	9,400	4,700	-	-	14,100
Whaling fleet:						
Sovetskaia Rossiia	33,150	-	33,150	-	-	33,150
Vladivostok	17,150	34,300	-	-	-	34,300
Catcher boats	850	2,550	5,950	11,050	3,400	22,950
Support fleet:						
Tankers	4,000	4,000	4,000	8,000	4,000	20,000
Repair ships	3,000	2/	3,000	-	3,000	6,000
Floating docks, large	2,500	2/	2,500	2,500	-	5,000
Floating docks, small	400	2/	400	400	400	1,200
Salvage tugs	1,000	1,000	2/	2/	2,000	3,000
Water carriers	3,300	3,300	6,600	3,300	2/	13,200
Total	-	136,110	125,455	94,985	53,470	1/410,020

1/Estimated.
2/Not available.

The additions to the Far East fleet in tables 4 and 5 were all vessels destined for distant offshore operations. Half of the 157 vessels specifically identified were medium trawlers (260 to 505 gross tons in size) and stern trawlers (2,600 to 3,200 gross tons); however, they accounted for only 21 percent of the gross tonnage. Motherships to store herring and factoryships to process fish and crabs were other important additions to the fleet. During 1960-63, known additions of motherships and factoryships to the Pacific fleet were 10, totaling 113,375 gross tons. The Soviets have recognized the need for all types of support to distant offshore fishing. Refrigerator transports, tankers, repair ships, floating docks, tugs, and water carriers give strong and vital support to fishing operations and the handling and processing of fish and shellfish. Nearly 40 such known additions, totaling 118,595 gross tons, were made to the Far East fishing fleet during 1960-63.

Major additions were also made to the whaling fleet. Three factoryships (totaling 67,450 gross tons) and 27 catcher boats (totaling 22,950 gross tons) were allotted to the Far East fleet.

The Soviets have relied on foreign shipyards for building a large part of their Far East fishing fleet. Of the known tonnage added to the fleet during 1960-63, an estimated 225,940 tons (55 percent) were constructed in the U.S.S.R. The remaining 184,080 gross tons were built in Poland (50,000 gross tons), West Germany (34,300 tons), East Germany (30,680 tons), Denmark (20,700 tons), Finland (16,200 tons), and unidentified countries (32,200 tons).

The trend in the Soviet Far East fisheries has been toward building vessels of larger tonnage. In 1960, the average gross tonnage of the 30 vessels added to the fleet was 1,782. The average tonnage increased each succeeding year--2,065 tons in 1961, 2,560 tons in 1962, and 4,253 tons in 1963. During 1960-62, medium trawlers were added in larger numbers. The sharp increase in average tonnage in 1963 can be attributed to the addition of 13 stern trawlers, compared with 9 during the previous three years; also, two new whale factoryships were added to the fleet.

Below are given descriptions of the classes of vessels added to the Soviet Far East fishing fleet during 1960-63. The data given are generally for the first vessel built in a class; subsequent additions to a class may have considerable modifications to improve efficiency of operation. Information is not available on the specifications of the whale catcher boats and support vessels assigned to the Far East fishing fleet.

MEDIUM TRAWLERS: During 1960-62, the following two classes of medium fishing trawlers (SRT--Srednii Rybolovnii Trauler) were added to the Soviet Pacific fishing fleet:

1. Without refrigeration (SRT): This class of medium trawler (fig. 3) is the most numerous of the fishing vessels in the Pacific offshore fleet. An estimated 500 to 600 SRT's participate in Soviet Far East fishing operations. Forty were delivered during 1960-62; data are not available on 1963 deliveries. SRT's have been constructed in the U.S.S.R.; they were also built in East Germany until 1959. The more recently built SRT's are about 260 gross tons in size, about 130 feet in overall length, carry a crew of 15, and have a cargo capacity of about 200 metric tons. The German-made SRT can only carry about 120 tons. In recent years, an estimated 50 SRT's were equipped with refrigeration plants and the ultimate plan of the Main Administration of Far East Fisheries is that all of its SRT's be refrigerated.2/

Fig. 3 - Trawler of SRT class. Vessel has no refrigeration equipment.

2. With refrigeration (Okean class): Built in East Germany, Okean motor vessels (also known as SRT-R or Srednii Rybolovnii Trauler Refrizheratornii) are conventional side trawlers, but also carry two boats for gill-net and ring-net fishing (fig. 4). Sixteen of these vessels were delivered during 1960-63. The vessels are 167 feet in overall length, 505 gross tons in size, and have a crew of 26. The fish caught (principally herring) are usually salted, packed in barrels, and stored in refrigerated holds at -4° C. (25° F.). The Okean-class vessels can work independently for 40 days at unlimited distances from shore; in the North Pacific, however, they are employed for months at a time as part of fishing fleets.

Equipment includes Soviet-manufactured radar, gyrocompass, radio-direction finder, and depth-determining echo-sounder (maximum depth 4,000 feet). A horizontal-vertical sounding

2/ Communication by Mr. Winthrop A. Haskell, Fisheries Management Agent, Bureau of Commercial Fisheries, Juneau, Alaska.

apparatus of German manufacture is capable of locating fish schools at angles ranging between 150° to port and 150° to starboard from the ship's forward direction at a distance of 6,500 feet. A thermometer which can measure water temperatures down to 120 meters (394 feet) is also used to locate fish concentrations.

Fig. 4 - Trawler of Okean class. Has refrigerated holds. Vessel uses conventional side trawl, and is also equipped for gill-netting.

Trawling is done only over the starboard side with 2 power-driven drums each capable of hauling 1,200 meters (3,937 feet) of warp at an average speed of 60 meters (197 feet) per minute. The length of the warps indicates that the maximum depth at which an SRT-R can fish is about 1,500 feet.

Gill-net fishing is highly mechanized, the net being hauled by a powered pulley in the starboard bulwark; 2 grippers pass the net over a shaking device. A fish-salting and packing machine, capable of processing 4.5 metric tons of fish an hour, is installed on the main deck to reduce manual labor. Average yearly Soviet catches for Okean-class trawlers amounted to 690 metric tons in 1959 and 710 tons in 1960. In the Far East, however, average catches were larger; the best vessels caught up to 1,100 tons in 1962 and over 2,000 tons in 1963.

STERN TRAWLERS: One of the most significant classes added to the Far Eastern fleet during 1960-63 has been the stern trawler, also known as the BMRT (Bolshoi Morozilnii Rybolovnii Trauler or Large Freezer Fishing Trawler). Four classes of stern trawlers are operated by the Soviets--Pushkin, Maiakovskii, Leskov, and Tropik. All except the Leskov class have been used in the Soviet Pacific fisheries. The Maiakovskiis predominate (21 were added to the Far East fleet during 1960-63); only one Pushkin was delivered before 1960, and one Tropik in 1963. The stern trawler may well become the predominant type among Soviet fishing vessels, because it is a completely autonomous unit capable of fishing at great distances from home port and processing its catch.

The U.S.S.R. embarked on mass production of stern trawlers in 1958, after their prototype, the Pushkin (constructed in West Germany from the design of the British-built Fairtry) proved successful under high-seas conditions. BMRT's are more productive than conventional trawlers, and can produce catches of as much as 20 to 25 metric tons a haul (Gorinov 1962). The average yearly catch per fisherman on a BMRT has been reported as being 51.6 tons, on a medium side trawler 30.4 tons. Small Soviet coastal trawlers produced only 16.7 tons per fisherman. The cost of catching a ton of fish on a BMRT comes to 120.5 rubles (US$135.5), much less than on smaller Soviet fishing vessels (Melnikov 1962).

The characteristics of the BMRT stern trawlers added to the Far East fishing fleet during 1960-63 are:

1. Maiakovskii class--Improved versions of the Pushkin, Maiakovskiis (fig. 5) have a cruising range of 16,000 to 17,000 miles and can stay at sea 80 days, of which 60 can be spent on the fishing grounds. The vessels are 3,170 gross tons in size, 278 feet in overall length, and operate with a crew of 102. Maiakovskiis are being constructed in U.S.S.R. shipyards at Nikolaev (on the Black Sea) at the rate of about 12 to 24 a year.

Fig. 5 - Stern trawler of the Maiakovskii class. Known also as a BMRT, the vessel is a completely integrated fishing and processing factoryship with freezing, canning, and reduction equipment.

Fishing equipment consists of a trawl and an electrically-driven winch for pulling

in the trawl and bringing it up the stern ramp. The fish brought aboard can be frozen, canned, or reduced to meal and oil. Two automated lines are able to fillet 20 tons of fish a day; another line beheads (by machine) and guts (by hand) 10 tons of fish a day. Two twin-chute freezing chambers use an air system capable of delivering a temperature of -35° C. (-31° F.). The fillets or dressed fish can be quick-frozen to a temperature of -18° C. (-0.4° F.) in about 3 to 4 hours. After glazing and packing, they are stored at -18° C. (-0.4° F.) in refrigerated holds with a volume of 1,330 cubic meters (46,969 cubic feet). The canning plant--two autoclaves and one sealing machine--has a daily production capacity of 3,500 cans. Oil is removed from cod livers in a rendering shop equipped with two boilers. The fish-meal plant has two single-drum units which can process 20 tons of fish or offal per day; the fish-meal hold has a capacity of 170 cubic meters (6,000 cubic feet).

2. Tropik class--The newest type of stern trawler in the Pacific fleet has been designed primarily for diversified fishing in the tropics, although it can operate in temperate and subarctic waters. Basically a trawler, vessels of the Tropik class are also equipped with (1) three line haulers for tuna long-line fishing[3]; (2) folding platforms along the sides of the vessel for tuna pole-and-line fishing; (3) two motor dories (each 30 feet in length) for purse-seining or line fishing; and (4) a fish-pumping plant for bringing aboard fish attracted to the vessel by electric lights. The vessel is equipped for experimental drift-net fishing. Tropiks can process catches by freezing, and can produce fish meal and fish oil from waste and offal and surplus fish.

Tropiks now have a crew of about 75; but by the time the last vessel in this class comes off the assembly line in 1965, further automation of equipment may reduce the crew to about 50 persons. The vessels are about 2,600 gross tons in size, 262 feet in overall length, and can stay at sea 60 days. Working and living quarters are air-conditioned. The refrigeration plant, consisting of 6 ammonia compressors, provides for (1) the freezing of 30 metric tons of fish in 22 hours; (2) cooling the holds to -25° C. (-13° F.); (3) producing 6 tons of flake ice in 15 hours; and (4) chilling 25 tons of fish a day from 30° C. (86° F.) to 2° C. (35.6° F.). Fish are dressed by hand and, after freezing, are packed in cartons stored in 3 refrigerated holds with a volume of 940 cubic meters (33,196 cubic feet). Processing equipment can handle 50 tons of raw fish a day--30 tons for freezing and 20 tons for reduction to meal and oil. Up to 3 tons of cod livers can be reduced to medicinal oil.

The Soviets have plans to assign 30 Tropiks to their Pacific fishing fleet. So far, only one, the Pegas, was delivered in July 1963 to the Sakhalin-based fishing fleet; during January and February 1964 it conducted exploratory operations for mackerel and jacks in the warm waters of the East China Sea. It also has fished for tuna in the South China Sea, in waters near the Indonesian coasts, and in the Gulf of Siam.

HERRING MOTHERSHIPS (Severodvinsk class): A herring mothership fleet consists of a large base ship (fig. 6) and a fleet of drifters or trawlers. Only trawlers have been reported operating in the Bering Sea. No processing is done on the mothership; the vessel is designed solely to receive and store the herring catches of fishing vessels. Immediately after being caught, the herring are salted lightly and placed in barrels before transfer to the mothership. The mothership provides the fleet with fuel, water, provisions, salt, barrels, and social and medical services.

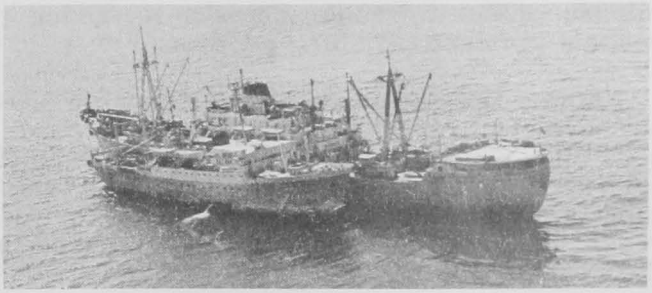

Fig. 6 - Herring mothership of the Severodvinsk class. Alongside is a stern trawler of the Maiakovskii class.

The Soviet Union placed an order for 11 Severodvinsk-class motherships in 1959 with the state-owned shipyard at Gdansk, Poland. All were delivered by 1963, and 5 were allotted to the Far East during 1960-62, principally for operations in the Bering Sea. Each vessel is about 10,000 gross tons in size, and has a crew of 257. It has 5 refrigerated holds of

[3]/The use of three line haulers is not explained in the original Soviet source (Rybnoe Khoziaistvo, vol. 38, no. 8, August 1962, p. 37).

10,150 cubic meters (358,444 cubic feet), sufficient to store about 5,000 metric tons of fish. About 200 tons of lightly salted herring can be chilled each day and maintained at 0° C. (32° F.), assuring the good quality of this highly perishable fish. A helicopter, which can take off from a landing platform situated at the stern of the ship, aids in tracking schools of fish. The vessel's hull is strengthened for navigation in ice, a feature that also enables the mothership to withstand the striking of drifters or trawlers against the hull during loading or unloading operations. Eight fishing vessels, four on each side, can moor simultaneously alongside the 500-foot-long mothership.

FACTORYSHIPS (Zakharov class): The factoryship is designed to process fish and shellfish into finished products, as well as perform the service functions of a mothership. Although a variety of factoryships are operated by the Soviets in the Pacific, floating canneries were the only type of factoryship added to the Far East fleet during 1960-63. The Zakharov-class floating cannery (fig. 7) receives fish and shellfish from its fleet of SRT's (medium fishing trawlers) or from the 12 motorboats that it carries. The motorboats are of the Japanese kawasaki type, specially designed for catching king crabs with tangle nets, but they can be used for other types of fishing. Though designated a cannery, the Zakharov is also equipped to manufacture fish meal and oil from wastes obtained during canning operations.

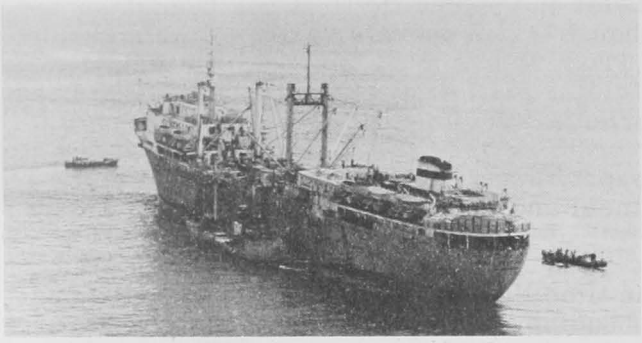

Fig. 7 - Factoryship of the Zakharov class. Alongside is an SRT trawler. The factoryship carries 12 motorboats for king crab fishing; two can be seen near the bow and stern.

Zakharov-class factoryships have been built at the Admiralty Shipyards in Leningrad since 1959. During 1960-63, 5 were delivered to the Far East, and it is reported that 3 more will be delivered in 1964. The vessels are 12,675 gross tons in size, 532 feet in overall length, and have a cruising range of 11,000 miles. Of the 640 people aboard, about 500 are processing workers and the rest are crew members. Processing equipment is capable of canning various species (e.g. herring, sardines, saury, ocean perch, and king crab), thereby enabling the factoryship to be used throughout the year. Automatic and semiautomatic machinery are consolidated into mechanized production lines. Daily capacity of the canning lines is about 1,600 cases, produced in three 7-hour shifts. About 2.4 tons of fish meal can be produced each day. Facilities are available for preparing caviar from salmon roe. The refrigeration plant is designed to (1) produce 25 tons of chipped ice each day, (2) cool fish in brine tanks, and (3) cool fish-storage and provision holds that have a total volume of 1,520 cubic meters (53,678 feet).

Considerable improvements have been carried out on recently constructed Zakharov-class factoryships. Reportedly, storage and ice production capacity have been doubled, and additional automation of production lines has made possible a reduction of 115 workers. The introduction of air-conditioning in the living quarters presages eventual deployment of those vessels in tropical fishing regions.

Soviet floating canneries are capable of remaining at sea independently for three months, but have been reported on Bering Sea grounds for as long as a year. In such instances, support vessels bring in supplies and transship finished products to Soviet ports. The Zakharovs have been observed during 1959-63 in Bristol Bay operating for king crab, and for a short time in 1963 in the western part of the Gulf of Alaska. The factoryships have also serviced vessels fishing for herring and ocean perch in Bristol Bay and saury off the Kuril Islands in the western Pacific.

REFRIGERATOR VESSELS: About 10 classes of refrigerator transport vessels have been used by the Soviet Far East fleet. The older classes act principally as refrigerator fish carriers (Refrizherator Rybnyi) and do not have equipment for quick-freezing fish. Construction of those classes has been discontinued. The newer classes, which are called production refrigerator transports (Proizvodstvennii Refrizherator), are designed to take fish on board at the place of capture, freeze them, and then deliver the frozen products to home ports.

The movements of the refrigerated and cargo fish carriers are controlled by the Administration of the Far East Refrigerator Fleet (Dal'Vostokrybkholodflot), headquartered at Vladivostok as part of the Main Administration of Far East Fisheries. The refrigerator transports are assigned to 11 operational units, each serving a Far East fishing fleet. In addition, an unknown number of cargo vessels transport salted herring in barrels.

At least 20 large refrigerator vessels were added to the Administration of the Far East Refrigerator Fleet during 1960-63. By 1963, a total of more than 70 refrigerator fish carriers were plying North Pacific waters, transporting processed, semiprocessed, and frozen fishery products from the fishing grounds to the mainland, thereby enabling fishing vessels to remain on the fishing grounds for long periods of time. The new additions to the Far East Refrigerator Fleet during 1960-63 were of the following five advanced classes:

1. Bratsk class--Eight refrigerator vessels of the Bratsk class were allotted to the Soviet Far East fleet during 1961-63. Those vessels--built in East Germany's Stralsund Volkswerft (Stralsund People's Shipyard)--are 270 feet in overall length, have a gross tonnage of about 2,500, carry a crew of 91, and can cruise for 40 days without replenishing supplies and fuel. The freezing and refrigeration plant consists of 2 freezer machines, 4 air-blast freezing tunnels, packing departments, refrigerating machines, and refrigerated holds. About 50 tons of fish--taken aboard fresh or iced from the catcher boats--can be frozen in a 22-hour period. Hold capacity of 1,800 cubic meters (63,566 cubic feet) permits storage of about 800 tons of frozen fish in cartons. Temperature in the holds is maintained at about -18° C. (-0.4° F.).

2. Tavriia class--Constructed in the Soviet Union, vessels of the Tavriia class (fig. 8) perform the same functions as those of the Bratsk class, taking aboard whole or gutted fish, quick-freezing them, and then conveying them to distribution centers on the Soviet mainland. Tavriias are 325 feet in overall length and 3,230 gross tons in size. Fish are frozen without further processing in two tunnel-type air-blast installations with a capacity of 50 metric tons per day. The fish are then placed in holds with a capacity of 3,300 cubic meters (116,539 cubic feet) at a temperature of -18° C. (-0.4° F.). In one hold the temperature can be lowered to -25° C. (-13° F). If the quantity of fish taken aboard exceeds the daily freezing capacity, 20 tons of fish can be preserved in flake ice and stored in coolers at 0° C. (32° F.). About 12 tons of flake ice can be produced each day.

Fig. 8 - Refrigerator transport of the Tavriia class. On board are facilities for quick-freezing and storing fish brought to the vessel by a fleet of fishing craft.

3. Pervomaisk class--Built for the Soviet ship-importing state enterprise (Sudoimport) by a Danish shipyard, Pervomaisk-class refrigerator vessels are 328 feet in overall length and about 3,300 gross tons in size. Air-blast freezer tunnels are fully automated. Further information on this class of refrigerator vessel is not available.

4. Sevastopol class--The largest refrigerator transports in the Soviet Far East fishing fleet are vessels of the Sevastopol class. Those vessels--430 feet in overall length and 5,525 gross tons in size--have been built at the Baltic Shipyard in Leningrad since 1961. Three were allocated to the Far East in 1962 and 1963. Sevastopols can freeze whale meat transferred from a whale factoryship, freeze fish without dressing them, and transport the frozen products to the Soviet Union.

The Sevastopol's freezing facilities, with a daily capacity of 100 metric tons of fish, consist of 8 air-blast freezing tunnels, each 39 feet long. Trays, each holding 33 to 40 pounds of fish, are loaded onto carts that are conveyed automatically through the freezer tunnels; the fish can be quick-frozen in $4\frac{1}{2}$ hours. The frozen fish are removed automatically and stored

at a temperature of -18° C. (-0.4° F.) in five holds of 5,400 cubic meters (190,700 cubic feet) and a total capacity of 2,700 metric tons of fish.

5. Skryplev class--Although designated a refrigerator transport, Skryplevs (fig. 9) are virtually a factoryship that can freeze fish and prepare fish meal and oil. A distinctive feature of this transport is a stern ramp fitted with a gate which can be closed. Fish can be taken over the side direct from a fishing vessel or the vessel can leave its trawl bag floating on the surface of the sea. The bags are marked by buoys, usually fitted with radar reflectors; the transport's radar is used to locate the bags and they are brought aboard up the stern ramp. Three vessels of this class (built in Denmark) were allocated to the Far East fleet in 1962 and 1963.

Fig. 9 - Refrigerator transport of the Skryplev class. Besides freezing fish, meal and oil can also be prepared. The stern ramp is used to bring aboard trawl bags brought to the transport by fishing craft.

Skryplevs are 300 feet long between perpendiculars, 4,700 gross tons in size, and carry (excluding the actual crew) 102 people for handling and processing catches. For short-time preservation of fish, two ice-making plants can produce 10 tons of flake ice per day from sea water. The transport is fully equipped with fish filleting and heading machines, and has fish meal and oil plants capable of handling 30 tons of waste, offal, and surplus fish per day. Cod livers can be processed into medicinal oil in a special liver oil plant.

WHALING VESSELS: Due to the special nature of whaling operations, the Main Administration of Far East Fisheries has established a special Administration of Whaling Fleets, which is in charge of Far East whaling ships operating in the North Pacific as well as the one in the Antarctic. This Administration organizes timetables for tankers delivering fuel and taking on whale oil, and keeps records on the production of the fleets. On the whaling grounds, however, operational command and coordination with catcher boats remains with the captains of the whaling factoryships.

Soviet Pacific whaling operations predate the foundation of the city of Vladivostok, but were conducted for many years on a small scale from shore stations. In the late 1920's, a United States cargo vessel was purchased and converted into a whaling factoryship. Renamed the Aleut, it began operations in the North Pacific during the 1932/33 whaling season. Aleut operations were limited to the western North Pacific until 1959, when it began to hunt whales along the western Aleutian Islands. In 1962, the Aleut operated briefly off Kodiak Island in the Gulf of Alaska, possibly on an exploratory mission. In 1962 and 1963, major additions were made to the Pacific whaling fleet; 3 factoryships and at least 27 catcher boats were allotted to the Far East. All Soviet Pacific whaling vessels are based at Vladivostok or Nakhodka. The factoryship additions were as follows:

1. Sovetskaia Rossiia--A sistership of its prototype, the Sovetskaia Ukraina (assigned to the Atlantic fleet), the Sovetskaia Rossiia was constructed at Nikolaev on the Black Sea and joined the Far East whaling fleet in 1962. The vessel is about 33,150 gross tons in size, 715 feet in overall length, furnishes logistic support to 20 catcher boats, and is reported to be the world's largest whale factoryship. The Sovetskaia Rossiia has participated in Antarctic whaling each year since the 1962/63 season.

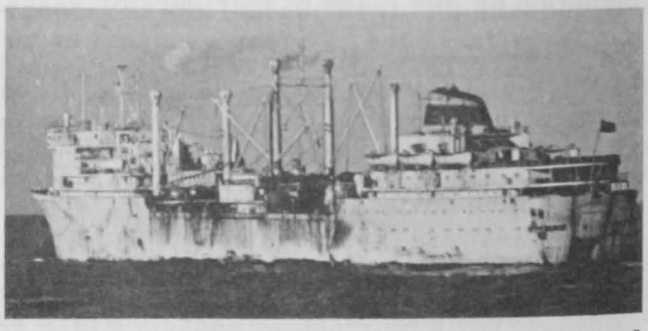

Fig. 10 - Whale factoryship of the Vladivostok class. The vessel is equipped for either whaling or fish processing.

2. Vladivostok class--In 1963, two newly constructed whale factoryships--the Vladivostok and the Dalnii Vostok--were assigned to the Far East fishing fleet. Constructed in West Germany, those vessels, each 596 feet in overall length and 17,150 gross tons in size, are equipped for either whaling or fish processing. The vessels (fig. 10) have a permanently installed whale factory, meal processing plant, and refrigerator tunnel. About 1,700 tons of raw whales can be handled daily by the whale factory to produce about 220 tons of oil, 200 tons of meal, 6.5 tons of vitamin oil, and 45 tons of frozen meat. When not whaling, a removable fish-processing plant is placed on the flensing deck; a daily quantity of 500 tons of raw fish can be processed into about 25 to 45 tons of fillets, 50 tons of frozen fish, 100 tons of fish meal, and 35 tons of fish body oil.

SUMMARY

The Soviet Far East Region, a geographical and economic rather than a political unit, includes all lands between Siberia and the Pacific. This Region extends over 3.6 million square miles or an area as large as the entire United States. Only about 5 million people, however, inhabit this huge land, which borders on Communist China to the South and on the Arctic Ocean and the Bering Sea to the North. The Soviet Government, anxious for the rapid economic and demographic development of such a strategically-exposed territory, is devoting large sums of capital to the build-up of the Far East economy.

Fisheries are the most important economic activity in the Soviet Far East, situated as it is on the vast and rich seas of the northwestern Pacific. The annual output of the Region's fishing industry, valued at nearly US$1.1 billion, represents about one-third of the value of the total industrial production of the Region. In 1963, the Far East produced over 1.5 million metric tons of fishery landings, or about one-third of the total Soviet landings of 4.7 million tons. In 1950, Soviet Far East landings had amounted to only 370,000 metric tons, which constituted a little over one-fifth of the total U.S.S.R. fishery landings that year.

This large expansion in production reflects the high priority which the central government in Moscow attaches to the rapid growth of the Far East fishing industry. Since 1946, well over one billion rubles (US$1.1 billion) have been allocated to the Far East provinces for the expansion of their fishing industry. Annual investments have increased steeply during the current 7-Year Plan (1959-1965) and represent approximately 1 percent of all Soviet industrial investments. The principal beneficiary of the current outlays is the Maritime Province (Primorskii Krai), whose yearly allocations increased eightfold in a decade. Most of the capital investments--currently up to about 75 percent--are spent on vessels. As a result, an unprecedented growth of the Soviet Pacific fishing fleet is taking place. During 1960-63, the Soviet Government added to this fleet over 200 modern fishing, fish-processing, whaling, and support vessels for an estimated gross tonnage of 500,000 tons. About one-half of that tonnage was constructed in domestic shipyards; the other half was purchased from Poland, West and East Germany, Denmark, Finland, and other countries. The trend in Soviet Far East fisheries has been toward building more processing and supporting vessels, vital for operating fishing vessels over long periods far from home ports or shore bases.

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Note: The author wishes to express his appreciation to Dr. Sidney Shapiro, U. S. Bureau of Commercial Fisheries, for his guidance and valuable comments on the substance of this article, as well as for expert editorial assistance.

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