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1. Management and Operation of the Fisheries.

The entire fishing fleet, the fishing industry, the equipment industry, and workshops, etc., in Murmansk, inland harbors, rivers, as well as in the Far East, are owned and operated by the State through the Soviet ^{Union - / Republic} Ministry for the Fishing Industry, of which ^{ISHKOV} Minister Istikov is the chief. His assistants include several vice ^{deputy} ministers. Under the jurisdiction of the same department are also housing construction and housing for fishermen and workers at plants, the technical school, and the research institutes of the fishing industry.

In every republic which has fishing and a fishing industry, there is a local minister of the fishing industry, who in turn is under the jurisdiction of the Ministry of the Fishing Industry in Moscow.

The training program for the fishing industry is also under the jurisdiction of the Ministry for the Fishing Industry. There are 4 high schools, one correspondence institute, 11 primary vocational schools, and 11 seamen's schools. Under the 1956 - 1960 Five-Year Plan, the following number of men and women will be trained in these institutions: 2,000 in the high schools, 13,000 in the primary vocational schools, 2,500 in the seamen's schools, and 5,800 in special technical schools.

There are 8 research institutes which work on biological problems and on fishing and processing techniques. These institutes have 23 special departments and employ 1,062 scientists. ^{In} terminology, Soviet/fishing enterprises are called collectives; these are associations of fishermen who are engaged in fishing exclusively. The combines are processing plants. Motorized fishing stations are state-owned stations which rent out large fishing vessels to the collectives. According to a report on the fishing industry,

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there are a total of 1,046 collectives, 1,905 motorized fishing stations, and 74 combines. The combines are merged into 11 concerns.

2. Employment.

A total of 500,000 persons are engaged in the fishing industry; of these, 90,000 are employed on the State's fleet (motorized fishing stations) and something over 100,000 in the collectives.

Manning of the fishing fleet presents no problem, for the necessary number of young men ~~are~~ are simply conscripted. The officers are governed by the central organization. After being graduated, they must have 2 years of practical experience as sailors on board fishing vessels.

3. Fishermen's Income From the Catch.

In Murmansk, the fishermen have a fixed minimum wage of 750 rubles per month. With every year of service, it is increased 20 percent, and is thus doubled ~~after~~ after 5 years. They also receive a share of the catch, and we are informed that a thoroughly experienced man usually earns between 3,000 and 4,000 rubles per month. In Murmansk, the annual share is said to ~~be~~ ^{average} about 40,000 rubles. The fishermen have a month's vacation per year.

4. Investments.

Five-Year Plan ~~investments~~ investments were as follows: 4,078 million rubles in the 1946 - 1950 period, and 7,690 million rubles in the 1951 - 1955 period; in the 1956 - 1960 period, it will be 13,280 million rubles.

5. The Fishing Fleet in Murmansk, the Catch and ^{its} Preparation.

The number of vessels in the fishing fleet in Murmansk is given as 300. This includes about 120 luggers, 130 trawlers, and some newly constructed supertrawlers of 2,700 gross registered

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tonnage of the Pushkin class. [redacted]

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[redacted] So far, 17 vessels of this type have been delivered.

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In the course of the year, 7 units will be completed, and negotiations are under way for the construction of another 24, half of which, it is expected, will be built in Soviet workshops.

The succeeding series of 24 vessels is to be built in the USSR, and is primarily intended for operation in the Far East. The vessels are equipped with facilities for freezing filets, for freezing small fish ^{whole,} [redacted] for rendering fish oil, for canning, and for producing fishmeal. The entire crew numbers about 100 persons.

Drag-trawls are used in fishing from this type of vessel. The fish are emptied out of the trawls, through hatches in the upper ~~deck~~ deck, into containers, and from there are passed to gutting benches. Rough dressing consists of making an incision from the anus forward, without cutting the throat. The entrails are removed; the liver goes into a hopper for the steam tryworks or the cannery, and the rest of the entrails go into a hopper for the fishmeal plant. All fish are decapitated by machine. Small fish unsuitable either for fileting or for freezing whole also go to the fishmeal plant. During the rough-dressing process, the fish are sorted according to size. The largest go to the decapitating machine, from there to the fil^eting machine, and finally to the packing department. The skin is not removed from the filets. Smaller fish go to the decapitating machine, and from there, to packing and freezing. The fish are not bleached, but the filets are nevertheless quite white. The rough dressing process starts as soon as the fish are dumped out of the trawl-net; and, from the time they are decapitated till they leave the fileting machine,

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they are subjected to constant rinsing.

On the processing vessels, the trawler crews ^{have} 6 men ~~on~~ on watch. Their hours are 6 hours on and 6 hours off watch, 2 men on the winch, and 4 men on the stern.

6. Catch Results.

From 1940 to 1950, the number of vessels in the fishing fleet was increased 44 percent; simultaneously, their fishing capacity was increased ~~at least~~ ^{at least} 127 percent. The expansion of the fishing fleet from 1950 to 1955 has been given as 111 percent.

The total catch for 1955 amounted to 2.7 million tons, which is an increase of 62 percent over 1950, and the 5-year plan ending in 1960 calls for expansion at the same rate with a goal of 4.2 million tons in 1960. A considerable portion of this is accounted for by fishing in the large inland lakes and rivers: 830,000 tons in 1950; 970,000 tons in 1955; and a planned increase to 1.1 million tons for 1960.

Almost half the fishing in inland waters is done in the Caspian Sea. The expansion possibilities of fishing in inland waters are thought to be limited, since an increase of the catch beyond 1.1 million tons would be too severe a drain on the fish population.

The goal ^{set} for the 1956 - 1960 catch-increase must therefore be met in distant waters. The catch on the high seas was 375,000 tons in 1940; 590,000 tons in 1950; 1,650,000 tons in 1955; and is to be 3.2 million tons in 1960, according to the plan. To attain this goal in the present 5-year plan, ~~the~~ the catch must be increased in the Barents Sea, the White Sea, the Atlantic Ocean, the Far East, and ⁱⁿ the Antarctic.

The annual catch in the Caspian Sea amounts to 410,000 tons at present. About 40 percent of the catch consists of herring and

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varieties of sprat; and about 30 percent, of various types of carp. To boost the fish population in the Caspian Sea, various new types of fish have been transplanted from the Black Sea. There are 22 kinds of herring in the Caspian Sea; a sprat variety [of herring] is especially numerous. Formerly, these were not caught in great quantity, but the catch has now been increased by making use of underwater shining. This form of fishing is called Professor Borisov's method. A small type of sprat is lured by a *light* to the mouth of a pipe, up through which water is ^{being} pumped. The fish is sucked into the tube and onto the deck of the vessel from depths of up to 100 meters.

The sprat caught here is not the Clupea ²¹ sprattus, and is not as good in quality as the Norwegian sprat. Formerly, from 10,000 to 15,000 tons of sprat were caught annually. Now, by means of *the light*, ~~the catch~~ amounts to 120,000 tons. Figures indicate that the fish population will ^(permit a catch) ~~be~~ of 500,000 tons [annually?].

Fishermen operate in the Caspian Sea the year around, following the spawning lanes. The most important fishing tackle used consists of standing seines, purse seines, fishing nets, and drift-nets.

In the northern part of the Caspian Sea, fishing is prohibited during June and July, which is the spawning season. The catch is frozen, canned, pickled, smoked, or delivered alive.

Last year, in Murmansk, a catch of 670,000 tons was brought in. The total herring catch, of ^{fat herring} ~~the catch~~ amounted to about 2 million hektoliters; this was all salted down on board. *The herring* ~~are~~ are caught in the Baltic Sea, the Barents Sea, and along the Murmansk shore. A like quantity of winter herring was caught in the Atlantic Ocean, that is to say, including everything from the winter herring along the Norwegian shore to the Iceland herring in the summer. This herring catch is also salted on board.

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Only a small portion of the herring catch is registered as being brought ashore at Murmansk. If it is assumed that the above-mentioned catch of 670,000 tons is brought ashore by a maximum of about 300 vessels stationed at Murmansk, it amounts to an average catch of about 2,200 tons per vessel, which is a very high average for a European trawler fleet.

7. Fish Combines (Processing Plants).

The combines may be organized by the Minister of the Fishing Industry. If one of the enterprises in the trust should have a deficit, ^{it} may be covered by funds out of the surplus of another enterprise. The surplus of the combines go to the Ministry, which allocates funds for capital equipment. The enterprise is only permitted to retain a small part of the surplus for cultural and social purposes.

Canning and refrigerating capacities have increased considerably during the postwar years. In 1950, the total canning production capacity was 363.8 million cans ; in 1956, 748 million cans . Plans call for increasing production to 1,240 million cans in 1960.

Refrigerating and freezing capacity was 39,400 tons in 1940, 133,000 tons in 1956, and the Plan calls for 207,000 tons in 1960. Deep-freezing capacity was 2,574 tons in 1955, and is expected to be increased to 6,243 tons in 1960.

8. The Combine in Murmansk.

M Fish Combine

The total fish catch landed at Murmansk amounts to up to 2,500 tons per day. Of cod varieties of fish, most of the small fish are salted whole on the spot, and the first days' catch on ordinary trawlers is also salted whole, partly slit. On the last 4 or 5 days at sea, the fish are iced down.

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The fish are unloaded in barrels, which are brought into the plant on a traveling crab. Some of the iced fish are brine-frozen. The brine ~~is maintained at~~ ^{is maintained at} a temperature of minus 22 degrees centigrade. Freezing is accomplished by plunging the fish into the brine loose, and passing them from one brine tank to the next on a conveyer belt. On leaving the brine, the fish have a temperature of minus 8 degrees. The frozen fish are packed in ^{burlap} sacks.

Whole-frozen fish are packed in barrels. The fish are pressed together by means of a tamper, and the cover is put on by machine.

The barrels travel on a conveyer belt from the time the fish are packed till the cover is put on. Next the barrels are driven away by trucks, (each carrying 9 barrels) to the warehouse or railway car. The whole-salted fish are sent to the consumption center, where they are freshened and smoked.

A portion of the iced fish is packed in boxes with ice and sent to Moscow and elsewhere.

The plant has a canning department which produces 15 different varieties of canned products. There is also a department for oil extraction and vitamin preparation. The livers of haddock, cod, and shark are used as raw materials.

The plant's production of frozen fish is estimated at 100 tons per day. Storage capacity for frozen fish is 2,500 tons.

It is expected that a new freezing plant, construction ^{of} which has ^{been} started, will have a daily production of 450 tons of frozen products and a 22,000-ton frozen storage capacity.

9. The L. Mai Combine in Moscow.

All raw materials for the plant arrive by rail, a large part of them from Murmansk, but frozen raw materials also come

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all the way from the Far East, from the Caspian Sea, the Black Sea, and the Baltic Sea. It normally takes 72 hours for a fish train to go from Murmansk to Moscow. Of the raw materials received, 60 percent comes frozen, 30 percent salted, and 10 percent refrigerated.

The labor force consists of 2,200 men and women. The plant is presently being expanded, and emphasis is on more efficient and mechanical operation.

The turnover has been about 360 million rubles annually. The plant produces 400 tons of finished food, 2,000 tons of salmon food-products, 5,000 tons of smoked fish, 4,000 tons ^{of} cod-liver and whale-liver oil; 75 percent of the fishoil is made from cod livers.

There is also a cannery at the plant, a department for vitamin preparations, and a plant for the production of vinegar. This is a completely independent installation with water supply from its own lake.

Recently, a Soviet-manufactured, completely modern molecular distillation plant was installed for the manufacture of vitamin concentrates from fish-liver oils. The principle of the method and the design of the apparatus are both identical with those of similar plant in Norway.

The production method is, practically speaking, the same as that used in similar plants in Norway. We have somewhat less manual work and fewer manually operated machines; autoclaves, etc. in our canning industry are more highly developed.

The plant has a frozen storage capacity of 11,500 tons, including 3,500 tons of deep-freeze capacity.

The finished products are transported in the plant's own trucks, and the whole output is sold in Moscow.

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10. The Combine in Astrakhan.

A Joe and "Gold" i.

Astrakhan is the main processing center for fish products from inland waters. In the Caspian Sea, herring-type fish are the most important, insofar as quantity is concerned. Thirty percent of the catch is made up of so-called sprat, and 10 percent is herring. These two raw products are used primarily in the canning industry and for products ^{packed} in oil, such as our herring sardines. The second group of fresh water fish, which makes up 36 percent of the total catch, is carp, some of which is made into prepared food at the combine; some is smoked, but most of it is sold as fresh fish. Sturgeon, ^{incidentally} ~~which~~, which provides the raw material, in the form of roe, for the production of caviar, ~~constitutes~~ only 2.3 percent of the fishing.

Fish varieties from the Caspian Sea, by biochemical criteria, must also be classified as true fresh-water fish; for one thing, they have not been proved to contain trimethylamin oxide. The salt content in the Caspian Sea is one-third that of the open sea.

A large part of the raw products are prepared for sale as finished food, by a more primitive kind of process than that used to produce what in Western Europe we call "pre-packed products". Especially in the large consumption centers, the large cities, a substantial part of the fish combine business is aimed at the production of ~~nonpreserved~~ nonpreserved products, mainly such items as smoked products, both warm and cold-smoked, products pickled in vinegar and spices, and, to a large extent, products prepared in aspic.

The cleanest heads, ~~for~~ ^{of} example, large, similar fish are not used for fishmeal, but are cooked under pressure; ~~the~~ the meat is separated from the largest bones and passed through a machine, where apparently carrageen agar or gelatin is added

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to the meat and stock and the whole spread out to cool in flat pans, with the meat evenly distributed in the aspic.

Deep-freezing of raw products in what we call "bulk form" is widely practiced. Sturgeon, carp, and salmon-type fish are whole-frozen in an atmospheric freezer and ^{are} later processed for ready-made dishes:

The freezing plant at the combine has complete slab freezers (of the same type used in Norway) for freezing small fish ^{whole} and also for the production of fish filets. It also has an atmospheric freezer with a capacity of 160 tons per day and a 6,000-ton ~~frozen-storage-capacity~~ ^{nominal} with a temperature ~~of~~ of minus 20 degrees centigrade, which rarely is reached. The temperature is usually minus 12, -13, -14, degrees centigrade.

In addition to the ready-to-eat products, production also includes 240,000 cans of hermetically-sealed products per day. The container factory produces 250,000 cans daily.

The production of hermetically-sealed products may also be taken to include the production of caviar, figures for which show a total production of 800 tons. This quantity must apply to at least the entire catch from the Caspian Sea of both salmon and sturgeon.

The combine receives 500 tons of fish per day, but with considerable seasonal fluctuation, since the heavy fish load occurs from April into the summer. The total annual catch in Astrakhan is 50,000 tons.

The labor force at the combine was given as 5,700 men and women. This figure appears to be high and may possibly include the fishermen who bring fish to the plant.

For the transportation of raw products in this large inland sea, they have a number of modern refrigerator boats, about 300 ^{tons}

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in size. The construction of these vessels is about the same as that of our small special refrigerator boats. These vessels sail around, especially in the eastern part of the Caspian Sea, and collect the catch directly from the fishing vessels. The so-called sprat are partly frozen in atmospheric freezers on board, and partly iced and refrigerated for transportation to the plant.

Part of the fish are brought ^{in in tank} ~~in~~ lighters, alive. Before the fish ^{are} taken up, ^{they are} ~~they are~~ first anaesthetized by electricity. The largest fish are taken up with dip-nets while the smaller fish are pumped up. The fish are also laid in barrels with ice while still alive, and ^{it is said} ~~that~~ that, in this manner, fish are kept alive for at least 48 hours. One end of the barrel is perforated with 5 holes.

11. Soviet Fishing Research.

The headquarters for the Soviet Union's fishing research, the so-called VNIRO, is located in Moscow. The director of VNIRO is the technologist, Professor Zaitsev. The space accommodations for the scientists working at the institute are very ~~poor~~ poor.

VNIRO has 8 institutes, including departments for deep-sea research, chemical-technical research in the processing field, departments for catch and fishing regulations, a department for catch reporting, a department for the testing and maintenance of fishing tackle, etc.

The institute has 38 fishing vessels at its disposal, including 20 large vessels, such as trawlers, loggers, and purse-seine boats. The vessels have modern technical fishing equipment.

The deep-sea research institute is currently working especially on the problem of fishing in distant seas, with the main emphasis on the North Atlantic, besides the Baltic Sea and the Black Sea.

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It is also concerned with the problem of increasing the catch in all waters, including ~~the~~ fresh water fishing. The fresh water fishing problem involves, particularly, maintenance of the stock wherever it is threatened with depletion.

The institute in Murmansk was completed in 1954. It is very well equipped and has far better space accommodations for the scientific staff than the Moscow combine. A number of scientists, hydrographers, plankton researchers, herring and cod specialists, and scientist who conduct seal surveys, work at the research institute.

The institute ^{maintains} ~~has~~ 3 deep-sea research vessels, 2 of which are used in the Norwegian Sea, and one in the Barents Sea. The last-mentioned vessel, "PORSEY II", is outfitted with modern equipment for taking water samples; this is an imitation of the Nansen-type equipment. It also has sonic depth finders of Soviet manufacture, which resemble the Hughes sonic depth finder, without the latest improvements. The vessel is further equipped with a horizontally-operated sonic depth finder. This is not designed for automatic sweeping, but is turned by means of a wheel. The observer must sit down in a small hole and sweep by manual operation. The direction of a possible contact can be read on a gyro-repeater, and the report on the contact is sent to the bridge by the use of a speaking tube. All of it is, accordingly, rather primitive, compared with modern Asdic equipment.

The vessel is also equipped with under-water television. The receiver looks like an ordinary television receiver. There is also a hydrostat. There is a powerfully constructed cylinder, in which a man can be lowered to a depth of about 200 meters, in order to study the behavior of fish and ocean-floor fauna with his own eyes. Experiments conducted with the aid of this device are described in publications.

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12. Fish Hatcheries.

By the river KURA in the southern part of AZERBAIDZHAN, there is a fish hatchery for sturgeon. The breeder fish are kept in a circular basin, which has been excavated in the sand, where the water level can be regulated as desired. The sturgeon are stripped of roe and milt, and, after the eggs have been artificially fertilized, they are placed in hatching boxes with running water. The water is let in through the wire gauze bottoms of the hatching boxes. Experience gained in other places has shown that the fry are very sensitive to metal. A ~~small~~ ^{small} ~~contamination~~ copper, for instance, is sufficient to kill the fry. Here it is claimed, however, that the fresh water used in the hatching of sturgeon does not affect the metal to the same extent as ocean water, and that mortality in the hatching boxes is low. After the sturgeon fry are hatched, they are counted in a very ingenious apparatus, in which the difference in the specific weight of fry and water is used to make possible a direct reading of the number of fry which are emptied into the apparatus.

The fry are then transferred to circular vats, in which the water is kept in slow rotation by means of water jets which are set at an angle pointing down toward the surface. At first, the fry are fed diatoms [?], which are grown in large rectangular basins; later they are transferred to large concrete tanks and fed larvae. The larvae are also raised at the station. They are grown in trays containing a mixture of earth, cellulose waste, and waste from the flour industry. The trays are kept in a building in which a temperature of 18 - 20 degrees is maintained.

The sturgeon fry is planted, among other places, in the Kura River. Fish 50 days old are about 10 centimeters long. To find out

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whether these young fish actually make their way to the Caspian Sea, some of them are fed larvae which have eaten food containing radioactive isotopes. The sturgeon fry thus become radioactive ~~themselves~~ ^{themselves}. To what extent the sturgeon fry ~~are~~ ^{are} injured by eating the isotopes is not certain, since the experiments have only been carried on during the last 2 years, but genetic investigations are under way. The isotope used in "marking" the sturgeon fry has a half-life period of about 3 months. This eliminates the possibility that people might eat the marked fish while it was still dangerous because of the radioactivity.

There is no information available about the catch return, or about how the young fish are recovered in the Caspian Sea. To decide whether a recaptured sturgeon is actually traceable to the hatchery, it has to be examined with a geiger counter. The method therefore has limited application, in addition to the fact that it is still uncertain to what extent it is injurious to the sturgeon fry themselves, or to their offspring.

In the vicinity of SUKHUMI by the Black Sea, by "the black river", there is a large modern hatchery for troutlings and a fry nursery. The station was recently expanded considerably. It is located in magnificent surroundings, close by the river which issues from the mountain directly above. The station draws its water supply from the river, in consequence of a dam which conducts the water into a channel. Along the channel, a whole row of basins have been excavated in the sand; in these the breeder fish are kept. Some of the basins are used for young fish which are to serve as breeder fish later on. The breeder fish are fed with fish, cut up into pieces of suitable size.

Below this installation is the hatchery proper. The fry are transferred to shallow, circular containers where the water current

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provides ~~for~~ circulation. The young fish are fed diatoms in the early stage, and later they are fed larvae, as at the sturgeon hatchery at the Caspian Sea. Cultures of diatoms and larvae provide the required food supply.

The results of planting fry at an early stage of development have been very good. They have therefore adopted the method of planting very young fish; and, in future, they will raise the station's breeder fish themselves.

The plant has only been in operation, in the present form, for 5 months and is still in the experimental stage.

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