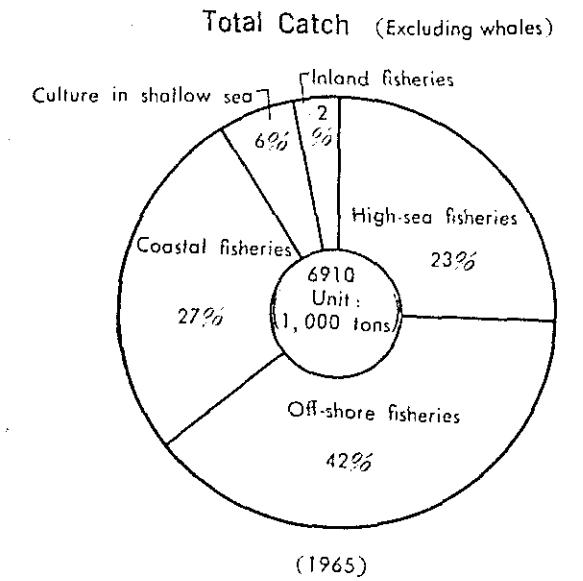
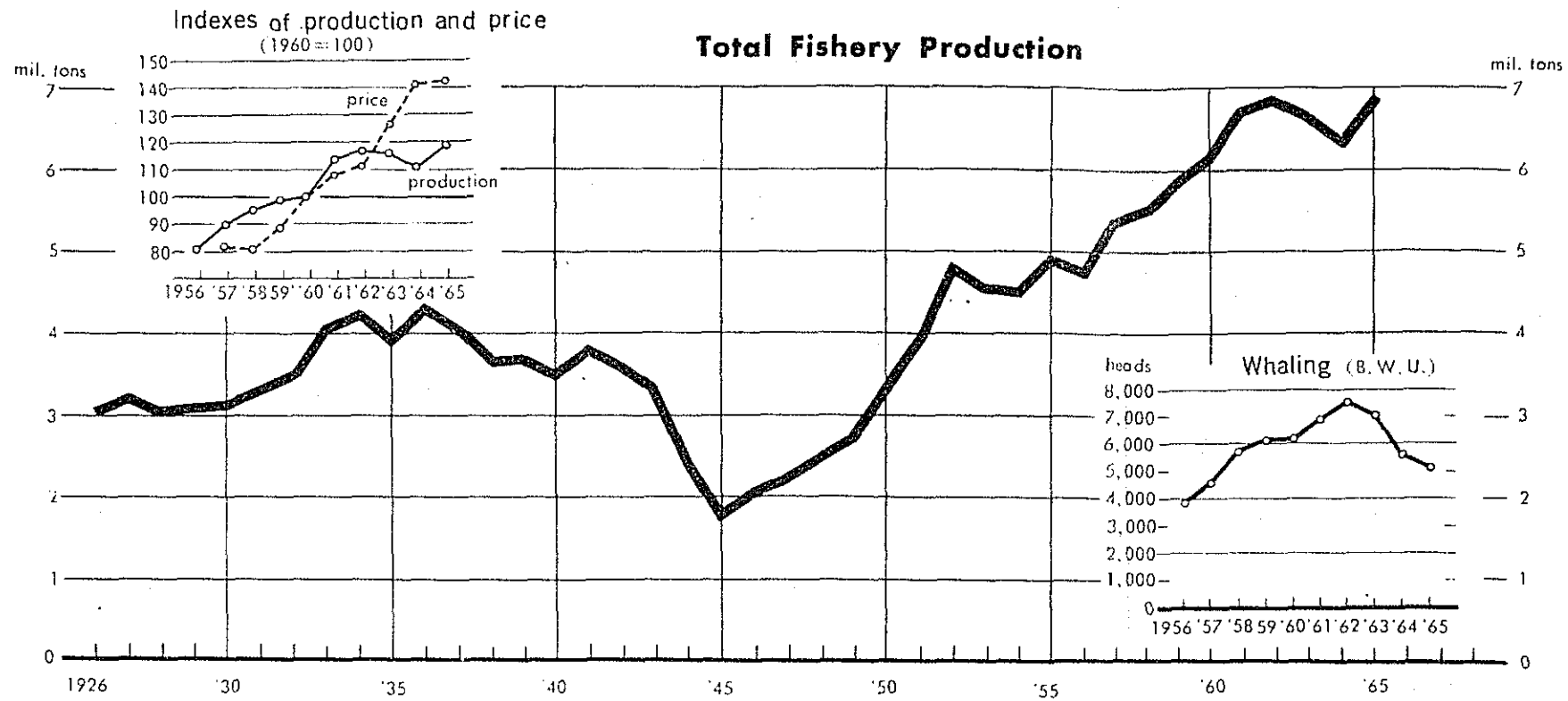


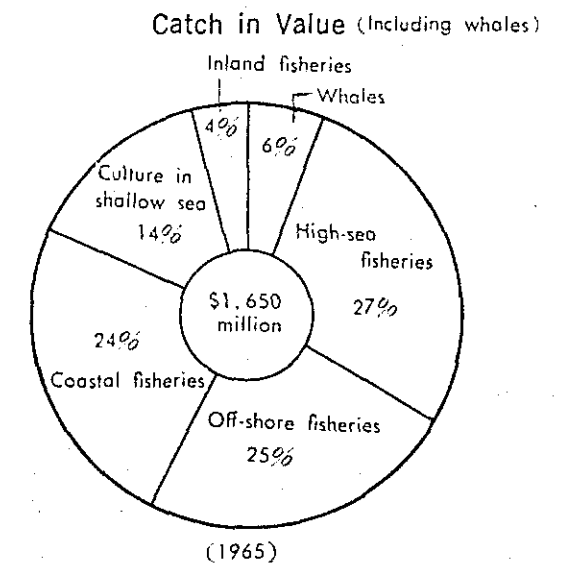
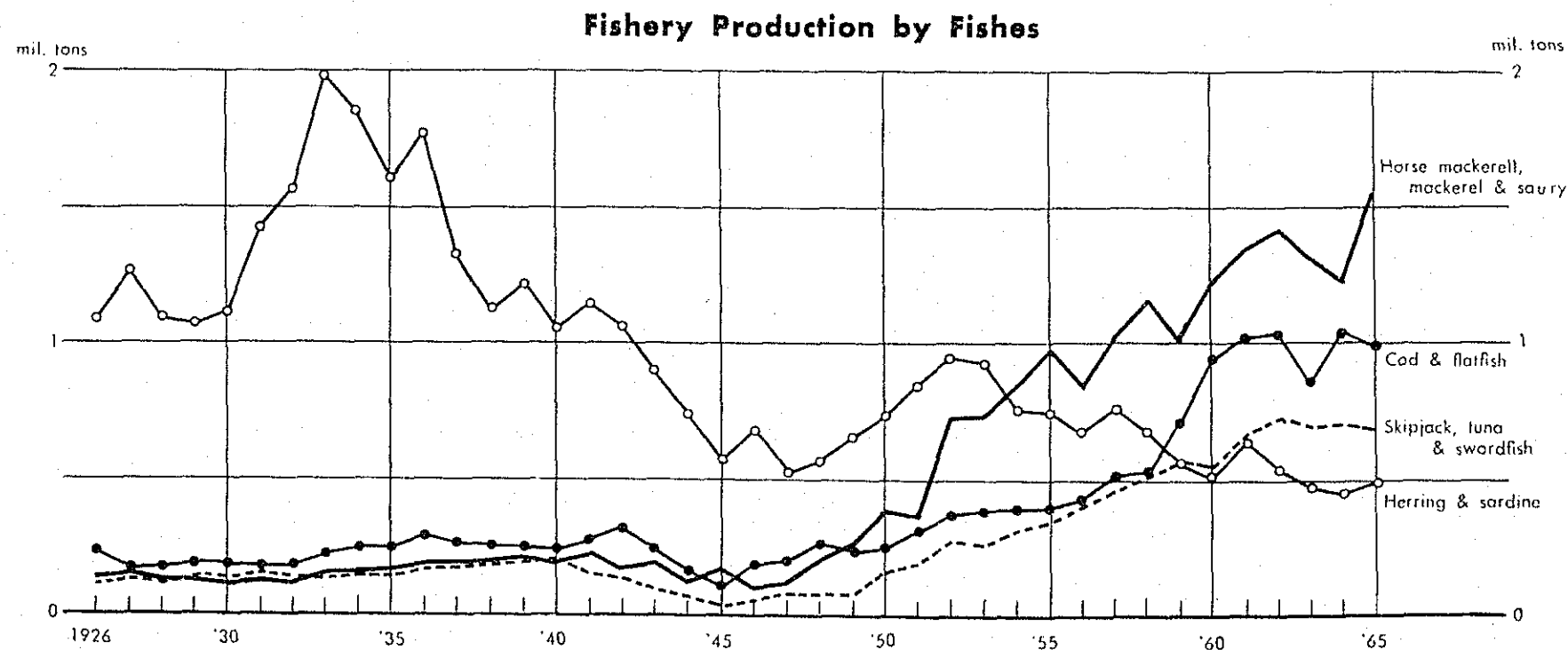
JAPANESE FISHERIES

OVERSEAS TECHNICAL COOPERATION AGENCY





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1967

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OVERSEAS TECHNICAL COOPERATION AGENCY

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Preface

It is a generally accepted idea in developing countries that the improved self-support of national provisions is a fundamental condition of the economic development of their countries. Further, as a counter-measure for the recent speedy increase in population, the increased production of food has come to be an urgent problem in those countries. Under these circumstances, the development of fishing industry which is an important supplying source of animal protein is considered to play a very important role in the economic development program of those countries.

Japan is an island country surrounded by seas on all sides and is blessed with fishery resources. Fishing industry, supplying the people with protein food, has promoted their health. With regard to fishery techniques, after the Meiji era, Japan has made continuous efforts to introduce advanced techniques of fishery from North America and Europe and to improve them, and now it has developed to one of the biggest fishing country in the world.

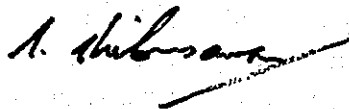
It is supposed that developing countries are tackling various difficult problems in the way of fisheries development of their own as we experienced in the past. For the purpose of cooperating with them in their projects, our country has already undertaken such services as dispatch of our fisheries specialists and experts to those countries, receipt of trainees from those countries, investigation on fishing port construction, etc. At the same time, we have prepared some pamphlets in English to give information on the actual status of our fishing industry in the hope that it may promote the understanding of readers about the history of fisheries, fishery techniques, processing and distribution of fishery products of our country.

We are very happy to inform that in cooperation with the Fisheries Agency we have prepared this time a revised and enlarged edition of "Japanese Fisheries", which will convey the latest and veracious information on our fishing industry.

It is hoped that this book will be of assistance in promoting better understanding of the fisheries problems in Japan. At the same time we wish to stress our desire for international cooperation in developing these problems in the future.

Our wholehearted acknowledgement is due to those persons for their generous assistance and guidance in the publication of this book.

Shinichi Shibusawa

A handwritten signature in black ink, appearing to read 'S. Shibusawa', with a long horizontal stroke extending to the right.

Director General
Overseas Technical Cooperation Agency
Japan

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Chapter I

Present Status of Japanese Fisheries and Future Prospects

Section 1. Position of Fishing Industry in National Economy

1. Fisheries and Natural Environment

Japan is a small country with an area of only about 369,000 km² and a larger part of the area is occupied by mountains which have arrested the progress of stock farming. Further, under the teachings of Buddhism, a traditional religion of this country, the eating of meat was prohibited for a long time. There was no food habit of taking meat until the Meiji Restoration in 1868. Owing to such natural conditions and habits, the consumption of meat by the people is limited to a small amount even now.

On the other hand, Japan is an island country surrounded by seas on all sides, and the fishing industry has carried out the service of supplying the people with important animal protein.

As indicated in Fig. 1, the warm current coming up north from the South-eastern Pacific Ocean is divided into two branch currents, the Japan Sea current and the Tsushima current, which wrap the islands and wash the shores. They help in the migration of warm current fishes such as skipjack, tuna, yellowtail and mackerel towards Japan. The cold current which comes down south from the Sea of Okhotsk or the Mamiya Channel wraps the northern islands and induces migration of cold current fishes such as herring, cod, saury and squid. These two currents are mixed in the coastal or the off shore waters of this country to form very good fishing grounds.

The continental shelves in the East China Sea and the Yellow Sea surrounded by the Chinese Continent, Korean Peninsula and the islands in the south-western waters of Japan furnish our country with good fishing grounds for bottom fishes and prawns. The Sea of Okhotsk and the Bering Sea form international fishing grounds not only of bottom fishes but also of high-priced fish such as salmon, king crab and prawn.

2. Recovery of Fishery Production after World War II

Japanese fishing industry, blessed with these good fishing grounds, developed favorably from old times. According to the FAO Statistics of 1964, the annual intake of aquatic products per capita in Japan amounts to 24.8 kg which is the highest in the world. (Fig. 2)

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Fig. 1 Current Chart of Adjacent Seas of Japan

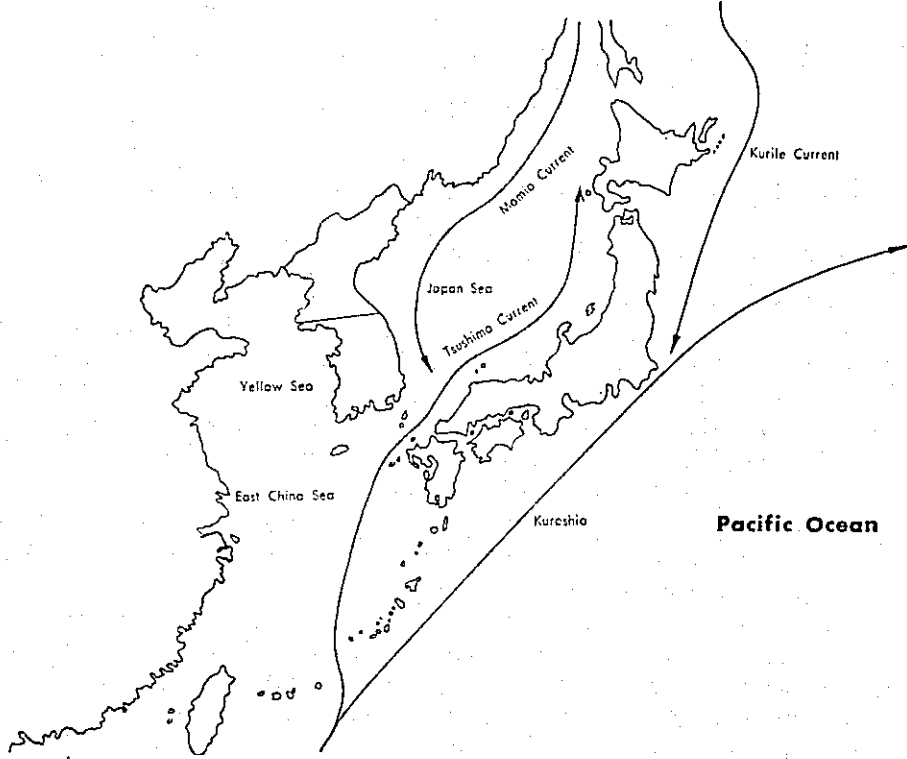
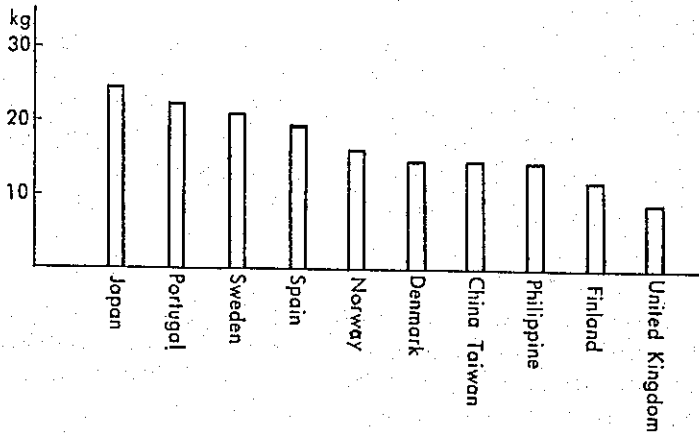


Fig. 2 Annual Intake of Fish Food per Capita (1964)



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Not only the annual intake of aquatic products is the greatest but also the kinds of sea food are various including mammals, fishes, shell-fishes and seaweeds. The method of their utilization is also diverse; they are eaten in the form of fresh, salted or dried food, canned food, sausage, smoked food, etc.

Owing to World War II, during which the majority of fishing boats were lost, and for want of fuel oil and fishing gear after the War, the fishery production in 1945 dropped to 1.8 million tons, about one third of the production in 1936, the highest record in prewar days. But under the reconstruction program of the government, designed to solve the serious shortage of food after the War, the power of the fishing fleet rose above the level of prewar days in 1949. With the extension of fishing grounds by the conclusion of the Peace Treaty in 1952, a little after the recovery of the fishing fleet, fishery production went up year by year. The fishing grounds of tuna were extended from the Pacific Ocean to the Indian Ocean, then to the Atlantic Ocean. At the same time in the northern waters of the Pacific Ocean fishing grounds began to be exploited. As a result of these efforts, the fishery production reached 7.10 million tons in 1966. (Ton means metric ton; the same hereinafter.)

Notwithstanding such speedy development of fisheries after the War, the position of the fishing industry in the national economy is not very high. Its relative importance in the national income in 1965 was only 1.9%, and that, in relation to the number of total workers in the country, is not more than 1.3% (Table 1). With regard to the export of

Table 1. Position of Fishing Industry in National Economy (1965)

	All industries (1)	Fishing industry (2)	(2)/(1)
National incomes (million dollars)	62,400	1,160	1.9%
Exports (")	8,452	330	3.9
Imports (")	8,169	104	1.3
Workers engage (1,000)	47,480	612	1.3

Note: The national income by fishing industry includes the incomes of fishermen from their fishery products processed by themselves on board and land, but it does not include the incomes of independent processors and manufacturers of fish.

fishery products, though Japan stands first in the world, the ratio of the sum in the total national exports is 3.9%, which is much lower than those in Norway and Iceland. In the balance between the export and the import, the former exceeds the latter 3 times as much, but if the recent speedily increasing tendency in the import continues, it is likely that Japan will become an importing country of fishery products before long.

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Section 2. Increased Demand for Fishery Products

1. Economic Growth and Increased Demand for Protein Food

The Japanese economy was nearly restored to pre-war level around 1953, and it is ascending ever since. Its growth in ten years from 1955 to 1965 shows a 10% increase real term in a year, indicating the so-called high-growth age. With regard to the incomes of people, the nominal annual income per capita, which was 200 dollars in 1955 jumped up to 690 dollars in 1965, showing an increase of about 3.5 times in only ten years. At the same time, a remarkable increase was seen in the consumption expenditures of people. The consumer price was stabilized before 1960, but from the latter half of the high-growth age, it has gone up even higher. It means that the actual income and consumption expenditures are lower than their nominal amounts. But it is true that a great improvement has been made in the living conditions of people. For example, the Engel coefficient which was 40% in 1960 came down to 36% in 1965. The increase of incomes has brought forth a great change in diet life of people. As indicated in Table 2, while the intake of vegetable

Table 2. Net Intake of Protein per Capita, per Day

Year	Total	Vegetable	Animal		
			Total	Meat	Fish
1951-55	62.1 g.	50.3 g.	11.8 g.	3.2 g.	8.6 g.
1956-60	67.6	53.6	14.0	5.3	8.7
1961-64	71.4	52.0	19.4	9.1	10.3

protein per day per capita is at a standstill, that of animal protein shows a great increase. Meat foods show a higher increase than that of fish foods. The intake of fish foods which was 73% of the total intake of animal protein in the period 1951 to 1955, came down to 53% in the period 1961 to 1964, showing a proportionate decrease.

The increased income has changed the nature of the food demands of people. The income elasticity* in 1964 was 0.6 total foods, while the income elasticity of grains was 0.09, showing the stagnant demand, that of meat, milk, eggs, fish, and vegetables was 1.3, 0.9, 0.6 and 0.7 respectively.

Because of the low incomes and the traditional rice eating habits, the diet life of Japanese people had largely depended on grains. But the high-growth age after 1955, has changed the pattern of diet life. Such improvements in diet life together with the wide use of durable consumer

* Income elasticity: $z = \frac{\Delta y}{\Delta x} \cdot \frac{y}{x}$ x : income y : expenditure of specific items
 Δ : increased amount of x and y in a specific period of time

PRESENT STATUS OF JAPANESE FISHERIES AND FUTURE PROSPECTS

goods such as television sets, refrigerators and motor-cars called "the consumption revolution" in Japan. The income elasticity of foods, except grains, is generally high, especially that of meat, milk and eggs was 0.9 or over, and exceeds that of fish. But the income elasticity of fish cannot be said to be low, because the income elasticity of European countries, U.S.A. and Canada is generally 0.2~0.3, and it is in rare cases that the elasticity for fish reaches 0.4 in those countries. In this way, the demand for fishery products by Japanese people, though small compared with that of meat, eggs and milk, cannot be said to be insignificant.

2. Increased Demand for Fishery Products and Fish Prices.

The increased demand for fishery products is reflected in the recent increasing tendency of the income elasticity. It is a general rule that the elasticity of foods declines with the elevation of income levels, but in Japan, with the exception of canned food, the elasticity is ascending, showing the increase in the demand for fishery products. This means that the demand for protein has been raised by the change in patterns of consumption by recent improvement of income.

Fig. 3 Change in Income Elasticity by Cross Section Method

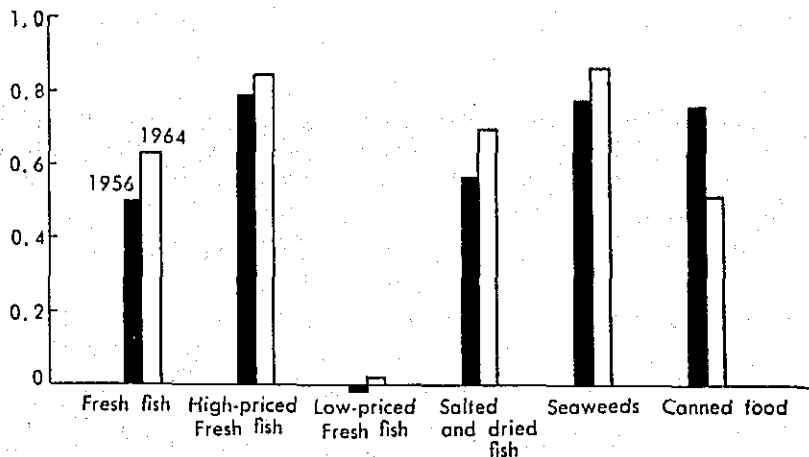


Fig. 3 shows the decline in the elasticity of low-grade fish between 1956 and 1964, indicating that the people's demand has shifted from low grade items to middle or high grade items. The decreased elasticity of canned goods was caused by a great drop in the consumption of canned goods of low-grade fish, such as sardine and mackerel. On the other hand, the consumption of high-grade fish such as salmon, prawn, crab and tuna in fresh or canned has been on the increases. The increased demand for

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seaweeds was brought forth by the strong demand for "nori" laver, an item especially favoured by the people.

Despite such increased demand for fishery products, production does not meet a demand because of limited fishery resources. Consequently the price of fishery products shows a steady rise because of the unbalance of supply in relation to demand.

Wholesale prices of commodities in Japan are generally stabilized and the rate of exchange to U.S. dollar is also fixed at ¥360, but the consumer prices, taking their own course, have steadily risen. They went up by 6% annually in the five years from 1960 to 1965, and still continues a tendency to increase especially in the price of fish foods.

The consumer's price of fish foods went up by 12% annually during these five years, while the producer's price of fish rose by 9% annually. The rise in prices of fishery products has brought forth "the problem of price", but it has given an impetus to the fishing industry, for the enlargement of fishing vessels and modernization of fishing gears and facilities.

3. Use of Fishery Products and Future Prospects

Table 3 shows the use of fishery products by the people. In the nine years from 1955 to 1964, the total supply of fishery products increased from 4,952,000 tons to 6,971,000 tons. The supply of food items increased from 4,249,000 tons to 4,775,000 tons, showing an increase of 12% while that of non-food items, mainly fishmeal, jumped up from 392,000 tons to 1,475,000 tons. Because of narrow land, the production of cattle is limited, but a speedy increase is seen in the production of pigs and poultry. In order to raise cattle, fish meal has come to be used in great quantities. As to fishery products for food, their use in processed form is increasing rapidly, while that in fresh form is at a standstill.

Table 3. Use of Fishery Products and Future Prospects (live-weight)
(Unit: 1,000 tons)

	1955	1958	1961	1964	1971	1976
Total supply*	4,952	5,651	6,798	6,971	8,895	9,788
(Home production)	(4,907)	(5,506)	(6,710)	(6,350)	(7,685)	(7,965)
For food	4,249	4,341	5,048	4,775	6,242	6,904
(1) Fresh	2,098	1,946	2,135	1,637	2,285	2,397
(2) Processed	2,151	2,395	2,913	3,138	3,957	4,507
Non for food	392	717	1,218	1,475	1,935	2,100
Exports	311	593	532	721	718	784
Edible food	1,843	2,254	2,631	2,473	3,207	3,547
Annual edible food per capita (kg)	20.7	24.6	27.8	25.6	30.6	32.6

* Total supply = Home production + imports.

PRESENT STATUS OF JAPANESE FISHERIES AND FUTURE PROSPECTS

Government is now drafting a new Economic Program, in which the demand for fishery products is estimated to grow up to 9 million tons in 1971 and to 10 million tons in 1976 against 6.9 million tons in 1964. The portion for export is estimated to show no marked fluctuations, but the home demand for food products and non-food products will increase by 32% and 47% respectively compared with that in 1964. According to this estimate, the demand for fishery products will increase sharply until 1971, and then the rate will see a decline because the national income per capita will reach 2,000 dollars or more by 1976 and the demand of people will develop towards foods of a higher category such as meat.

Section 3. Present Status of Fishery Production and Future Prospects

1. Fishery Production and Catch (in value)

The fishery production of the world in the period from 1955 to 1964 increased from 28.8 million tons to 51.6 million tons showing 6% increase per year, while the Japanese fishing industry in the same period produced 4.9 million to 6.4 million tons, showing a 2.8% increase. Consequently, the Japanese production which occupied 17% of the world production in 1955 dropped to 12.3% in 1964. On the other hand, the fishery production of Peru made a surprising advance in the same period; 230,000 tons in 1955 to 9.1 million tons in 1964. Since 1962, Japan has come to rank second in the world fishery production followed by the Soviet Union, which has made a great and speedy progress in production, and is now pressing on to the level of the Japanese fisheries (Fig. 4).

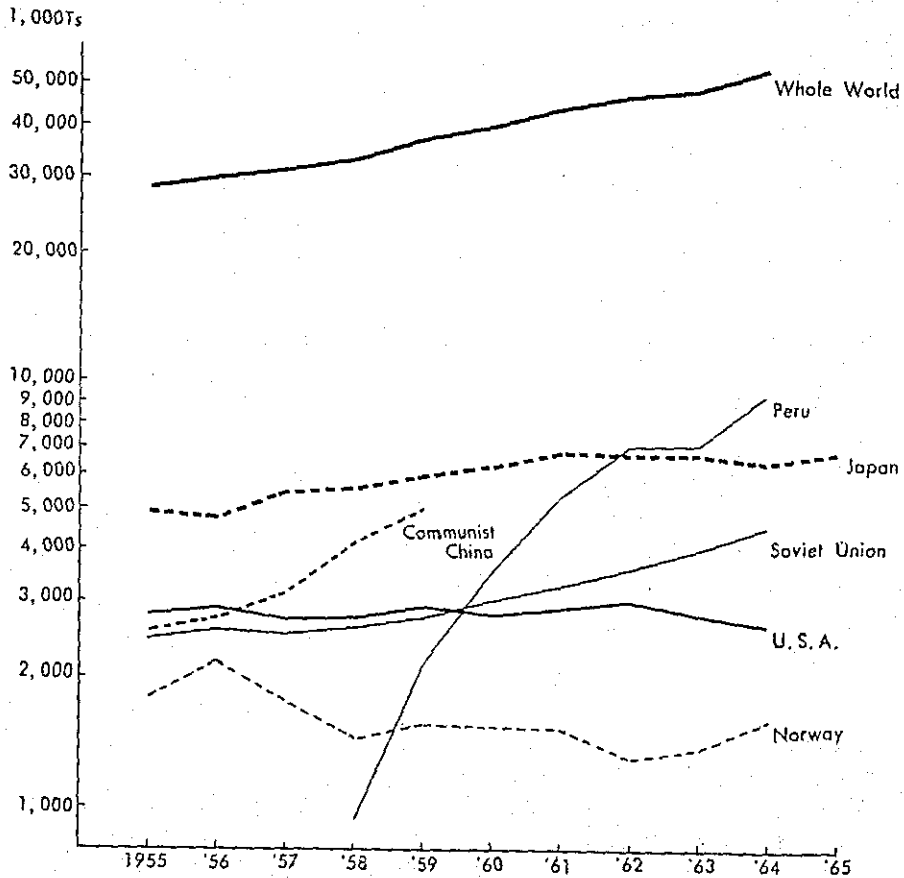
With regard to the catch in value, however, Japan is still at the top. The value in 1964 amounted to 1380 million dollars, greatly exceeding that of U.S.A., the second-placed country, which reached 390 million dollars (2.6 million tons in quantity). The reason for the high catch-value in Japan can be assigned not only to the high rate of production of high class fish such as salmon, crabs, prawns and tuna, but also for their high prices since they are sold in very good quality in big coastal cities.

2. Special Features of Fishery Production in Japan.

Further, fishery products have varieties and are not limited to special kinds. Before World War II, the percentage of sardine and herring in the total production was very high, occupying 43%, but after the War, in contrast to the severe decline in their production, the production of cod, tuna, mackerel, horse mackerel, saury and squid has increased. The proportion of these fishes can not be said to be very high. Even cod which occupies the first place in the list does not exceed 13% of the total production showing that there is no fish which occupies a specially

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Fig. 4 Change in Fishery Production of the World and Major Fishing Countries
(Unit: 1,000 tons)



distinctive position after the War (Table 4). This means that the Japanese fishing industry is not bound to special fishing grounds or fish species, but various fishing methods are exploited in broad oceans. Under such conditions, even though poor catches are experienced in a certain fishing area or by a certain type of fisheries, good catches in other areas or by a different types of fisheries will offset the loss and help stabilization of fishery production.

The percentage of fishery production by types of fishery in 1964 was as follows; 31.4% by trawling; 21.2% by purse seine fishery; 21% by pole and line fishery. With the recent advent of stern trawlers, the catch percentage of trawling has increased, and the recent remarkable mechanization of purse seine fishery, together with the enlargement of the size of fishing vessels, will increase the percentage of their production. It is to

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Table 4. Catch by Species

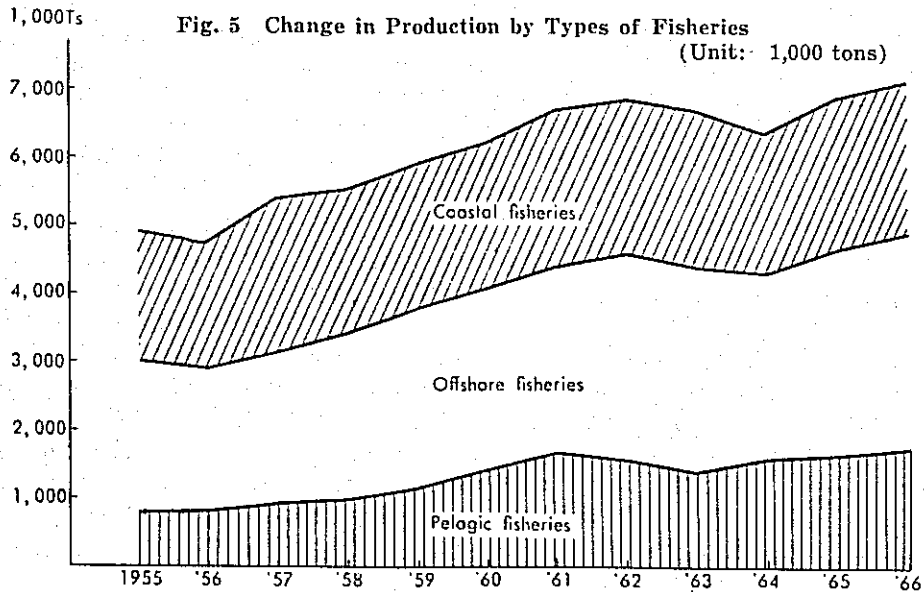
(Unit: 1,000 tons)

	1934		1964	
Catch amount	4,272	(100 %)	6,350	(100 %)
Cods	169	(4.0)	779	(12.3)
Horse mackerel	27	(0.6)	519	(8.2)
Tuna	60	(1.4)	513	(8.1)
Mackerel	106	(2.5)	495	(7.8)
Sardine	1,467	(34.3)	383	(6.0)
Saury	32	(0.8)	210	(3.3)
Herring	383	(9.0)	57	(0.9)
Squid	98	(2.3)	329	(5.2)
Others	1,508	(35.2)	2,712	(42.7)
Shellfish	86	(2.0)	147	(2.3)
Seaweeds	336	(7.9)	206	(3.2)

be noted that though the production by fish culture in shallow seas now occupies only 5.7% of the total, it is increasing year by year.

3. Tendency of Fishery Production by Coastal, Offshore and Pelagic Fisheries

The fishery production of Japan which reached 6.86 million tons in 1962 declined in 1963 and 1964. But in 1966 it reached the level of 7.10 million tons. The percentage of catches by coastal, offshore and pelagic



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fisheries, which was respectively 40: 45: 15% in 1955, changed to 34: 42: 24% in 1966. It is supposed that the increasing tendency of catches by pelagic fisheries will continue hereafter (Fig. 5).

(1) Coastal Fisheries

Coastal fisheries include the fixed-net fishery, beach-seine and culture in shallow seas which are operated in coastal waters as well as fisheries by boats under 10 tons, mostly operating a day's trip. The production by boat fishery and fixed-net and beach-seiners is at a standstill or decreasing, but that by culture in shallow seas is making rapid progress (Table 5).

Table 5. Production by Coastal Fisheries

	(Unit: 1,000 tons)				
	1955	1958	1961	1964	1966
Total	1,907	2,045	2,247	2,147	2,278
Boat fisheries	1,455	1,574	1,665	1,543	1,625
Fixed-net and beach-seine	298	256	260	241	248
Culture in shallow seas	154	215	322	363	405

In spite of the large number of fishermen engaged in boat fishery and fixed-net and beach seine, the size of the fishery operations being small, great expectations cannot be entertained of an increased production in the future. But as high-priced fishes are caught in coastal waters, their catch in value is comparatively high and with the recent equipment of small boats under 10 Ts with diesel engines, synthetic fibre nets, small radio apparatuses, fish finders, direction finders and transreceivers, there are many cases where the family management of coastal water fisheries is enjoying success, showing that the prospects of coastal fishery management are not always dark.

The prospects of culture in shallow seas, such as that of laver, oyster or pearl, are the most hopeful in coastal fisheries. As an example of the recent remarkable development of fish culture, we can point out the cultivation of prawn, salmon, sea bream and yellowtail. Though the production by the culture in shallow seas in 1964 occupied only 17% of the production by coastal fisheries, its catch in value reached 36%, showing that these products are highly appraised by the people. In view of the possibility of culture in shallow seas growing to be the mainstay of coastal fisheries with the recent remarkable development of culture techniques, the government is positively adopting a promotion policy.

PRESENT STATUS OF JAPANESE FISHERIES AND FUTURE PROSPECTS

(2) Offshore Fisheries

Offshore fisheries are those operated in offshore waters for a week or ten days, with fishing boats from 10 to 100 Ts. (For the purpose of fishery statistics, they are defined as fisheries other than coastal and pelagic fisheries.) The production by offshore fisheries in 1964 occupied 41% of the total amount but only 26% in value. Because of the large quantities produced and because of low prices, the fishery products of this category are playing an important role in the supply of protein to the people. About half of the production by pelagic fisheries is appropriated to export, while almost all the production by offshore fisheries is allocated to the domestic market.

The catches by coastal fisheries, because of high prices, are chiefly consumed by restaurants, hotels and people in the high-income groups while those by offshore fisheries are widely consumed by general public in cities and farmers, and they are also processed into canned food, salted and dried food and sausages in big percentage.

Table 6. Production by Offshore Fisheries

	(Unit: 1,000 tons)				
	1955	1958	1961	1964	1966
Total	2,145	2,391	2,680	2,540	2,772
Medium trawl	507	554	691	788	597
Purse seine	571	552	797	880	1,123
Saury stick-held dip-net	482	543	438	198	227
Gill-net	116	170	149	148	132
Angling, long-line	383	478	521	463	618
Others	86	94	84	63	75

As indicated in Table 6, offshore fisheries consist mainly of purse seine fishery, medium trawl fishery and squid and mackerel pole and line fisheries. The recent production by these fisheries except that of medium trawl and purse seine fisheries is somewhat stagnant. It means that the fishery resources in the off-shore waters of Japan have already been exploited, and in spite of limited fishing grounds the fishing vessels tend to be enlarged and although there is a rise in fish prices, the cost of production has also increased through the increase in the cost of labor and other expenses. In this way the offshore fishery managements involve difficult problems relating to fishery resources and management.

(3) Pelagic Fisheries

Pelagic fisheries are those operated in the high seas generally for more than 10 days with fishing boats over 100 Ts. For the purpose of fishery statistics, the following fisheries are included therein:

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- (a) All types of fisheries operated with mother ships;
- (b) Large factory type trawling in the waters of the North Pacific and in the off-shores of Africa, etc.;
- (c) Trawling in the East China Sea and the Yellow Sea;
- (d) Skipjack and tuna fisheries operated with large fishing vessels.

Before the conclusion of the Peace Treaty in 1952 Japanese pelagic fisheries were limited to Antarctic whaling and tuna fishery in the Southern Pacific, and these were operated by mothership-type fleets. After 1952, the salmon and crab fisheries in the Northern Pacific Ocean were resumed and the fishing grounds of tuna were extended as far as the Atlantic and the Indian Oceans. Since 1960 the large trawl fishing grounds have been developed in the off-shores of Africa and factory-large type fishing fleets of the 3,000 ton class are being operated there now.

With the advancement of fishing fleets to distant waters away from Japan, it has so happened that on-the-spot sales of catches are found more profitable than carrying them home, and that fishing operations from foreign bases in cooperation with the capitalists there are very advantageous.

Table 7. Production by Pelagic Fisheries

	(Unit: 1,000 tons)				
	1955	1958	1961	1964	1966
Total	760	975	1,682	1,544	1,912
Salmon & crab fisheries	128	113	76	72	64
Large trawl fishery	344	425	1,053	899	1,227
Tuna fishery	175	301	434	452	403
Others	113	136	119	121	168

Table 7 shows that the rate of production by tuna fishery and large trawl fishery in the total production by pelagic fisheries in 1966, was very high, occupying 24% and 75% respectively, while the percentage of the combined catches by salmon and crab fisheries was only 3.7%.

Whaling (as a rule, the production in quantity by whaling is not included in the Statistics of Fish Catches of Japan.)

The total production by Whaling in 1966 amounted to 22,784 whales (3,445 in BWU), of which 12,702 whales (2,340 in BWU) were caught in the Antarctic Ocean. Japan is the greatest whaling country having 52% share in the Antarctic Ocean under the International Regulation of Antarctic Pelagic Whaling.

(4) Inland Water Fisheries

The production by inland water fisheries in 1966 was 140,000 tons, which is rather small in quantity compared with other fisheries. With

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the recent increase of factories and plants in inland areas and with the wide use of agricultural chemicals in farm lands, the conditions of inland water fisheries have deteriorated. But the increased demand for 'ayu' (sweet smelt), eel, salmon and trout has given a great impetus to the development of their stocking and culturing work, and inland water production in 1966 increased by 40% compared with that in 1955.

4. Future Prospects of Fishery Production

Since the intake of animal protein of the people should be encouraged and the development of livestock industry is limited under geographical conditions, the supply of necessary protein depend mostly upon fishery products. As already mentioned, although the demand for fishery products will increase, it is questionable whether the supply will meet the increasing demand.

According to the New Economic Program being studied by the government, through the positive enforcement of promotion measures such as exploitation of new fishing grounds and introduction of new fishery techniques, the fishery production in 1971 and 1976 will go up to 7.7 million tons and 8 million tons respectively. Even with such increased production, the demand of people in the future cannot be fully satisfied, and it is estimated that about one million tons of foreign fishery products, including food and non-food products (in live-weight) must be imported in 1971. As to one million tons of foreign fishery products to be imported, 70% of them will be occupied by fish meal.

Section 4. Number of Fishery Workers

The actual number of fishery workers is difficult to estimate because they live widely scattered along the coast lines over the country as well as in inland areas, and they are mostly seasonal workers.

Table 8. Changes in Number of Fishery Workers Engaged

(Unit: 1,000)

	1960	1961	1962	1963	1964	1965	1966
Total	723	699	667	626	612	612	607
Coastal fisheries	509	491	469	446	439	440	435
Offshore & Pelagic fisheries	214	208	198	180	173	172	172

Table 8 shows the number of fishery workers in the coastal cities, towns and villages, who engaged in fisheries for more than 30 days in a year and whose annual income is chiefly derived from fisheries. A speedy decrease has been observed in their numbers after 1960.

Since the feudal days, fishermen settled in coastal villages in great

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numbers. Because of the small scale of their business and the somewhat over-population in coastal waters, their incomes were very low. Further, after World War II, a great expansion of population was brought about in fishing villages by repatriated persons from foreign countries and battle-fields, as well as by those returning home having lost their jobs in cities and towns during the war. But as soon as the highrate growth of Japan's Economy was brought about after the War, and the labor market was enlarged in general industries, the dense population in fishing villages in which 800,000 fishery workers inhabited in 1955, began to be absorbed into other industries in urban areas.

The annual decreasing rates of fishery labor power in the two periods of 1955-60 and 1960-65 were 2% and 3.4%, showing a higher rate in recent years. With regard to the labor power of coastal fisheries, the annual decreasing rate in the two periods was 3%, showing no change in these ten years, but in case of offshore and pelagic fisheries, the decreasing rate in the former period was as low as 0.1% while that in the latter period was 4.2%, showing a substantial decrease.

The workers of coastal fisheries consist of independent fishermen or belongings to a fishing family, while those of offshore and pelagic fisheries are largely employees who engage in long fishing voyages, under difficult working conditions. These are causes why the fishery workers are apt to change their employment. The labor power in offshore and pelagic fisheries which was formerly supplemented by that in coastal fisheries has come to decline since 1955, because of the decrease in the absolute number. The recent speedy decrease in the number of fishery workers in offshore and pelagic fisheries has probably been brought forth by these complicated reasons.

The number of fishery workers in this table is reported as somewhat smaller than the actual number, because in these statistics the number of fishermen who lived only in coastal cities, towns and villages have been summed up, but those living in inland areas have been excluded. Though the Fisheries Census in 1963 corrected such defects, it covered the entire number of fishery workers only one year. According to the Census, the labor power in that year consisted of 742,000 workers, exceeding by 20% in the number of workers (626,000) mentioned in Table 8.

The decrease in labor power of fisheries has greatly affected the fishing industry at large and even changed its course.

- (a) The labor power per management unit and boat was reduced suddenly, and thereby the productivity and income level per worker have been promoted;
- (b) As a countermeasure for the shortage in labor power, the introduction of improved fishing machinery and the modernization of equipment have been accelerated;

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- (c) The shortage in labor power has induced increased wage and raised the "right-to-speak" of workers;
- (d) The management has hastened to make improvements in marking conditions to secure labor power and to modernize fishery.

These are the direct influences of the shortage of labor power on the management of fisheries. Fisheries in the past was based on the principle of intensive labor relating to the fishing operations, distribution, processing, management, labor conditions, exploitation of fishing grounds and fishery regulations. But now the shortage in labor has changed such managements into an intensive capitalistic system. Though the modernization of the fishing industry, pushed forward by the shortage of labor, has produced various frictions among the persons concerned, it is deemed a proper disposition from the long-run point of view.

Fig. 6 Change in Age Structure of Fishery Workers

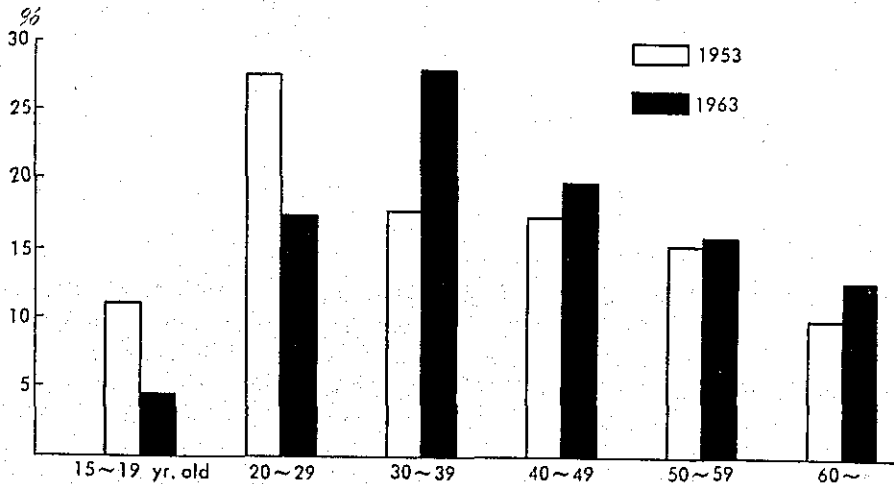


Fig. 6 shows the changes in age structure of fishery workers in the ten years from 1953 to 1963. The young labor power was reduced in these years while the advanced age labor power was developed, indicating a weakening in labor power. In view of the nature of the fishing industry which is supported by labor of young workers, on board the fishing boats the weakened labor and absolute shortage in labor are considered to necessarily cast a gloom over the future of the fishing industry.

Because of the recent increase in the incomes of fishery workers and the intensified modernization of the fishing industry, the annual decreasing rate of labor power in the future will grow by 2.7%. Upon such assumption, the government, in the New Economic Program, stresses the

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need of carrying on a strong policy for the introduction of labor saving techniques, so that the required labor power may be secured, and the efficiency of labor be improved.

Section 5. Fishery Management and Income Level

1. Number of Management Unit and it's Change

The total number of fishery managements in 1964 amounted to 229,000. Compared with those in the past ten years, a declining tendency is seen in their number, but it is weaker than that of labor power engaged in fisheries (Table 9). It has been said the structure of Japanese fishing

Table 9. Change in Number of Managements
(Unit: 1,000 managements)

	1956	1960	1964
Total	238.0	234.8	228.6
Coastal fisheries	228.1	225.2	219.9
Culture in shallow-seas	41.5	50.8	60.5
Others	186.6	174.4	159.4
Fisheries other than coastal fisheries	9.9	9.6	8.7
10~ 30 tons	5.9	5.5	4.8
30~100	2.7	2.8	2.5
100~200	0.8	0.7	0.6
200~	0.5	0.6	0.8

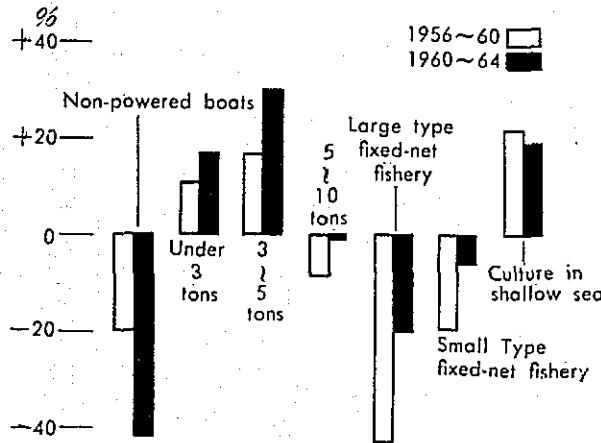
industry has the shape of a pyramid, with many small coastal fishery managements at the base and with offshore and pelagic fishery managements of smaller numbers piled upon them. The number of coastal fishery managements in 1964 occupied 96% of the total and the percentage of their incomes occupied 18% of the total. (This income does not include their additional value made through the processing and distribution on boat and land.) Because a number of large managements operate not only fisheries but also carry on processing or marketing, the difference in actual incomes between large and small managements becomes very large. With regard to the absolute number of all managements, there has been no remarkable change, but it varies according to the scales of management.

Fishing industry compared with agriculture is changeable not only because of its instability in production, but also in its management, because of the easy way of trading fishing vessels which are important means of production. Further, with the recent shifting of fishing labor power to other industries, great changes have occurred in the structure of fishery managements. With regard to the change in coastal fisheries in the two periods of 1956-60 and 1960-64, the number of managements

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as non-powered boat fisheries, 5-10 ton class boat fisheries, fixed-net fisheries and beach seine fisheries decreased, while that of managements of small powered boat fisheries and culture in shallow seas rapidly increased (Fig. 7). The reason for the decrease in numbers can be assigned

Fig. 7 Increase and Decrease in Coastal Fishery Managements



to the inefficiency as in case of non-powered boat fisheries, and to the conservative fishing methods, as in the case of fixed-net and beach seine fisheries which require much employed labor power. But the increase in number of other managements is due to the availability of management within the limit of family labor as in case of small powered boat fisheries and culture in shallow seas and with the introduction of new fishery techniques, their management has been improved. In short, the Japanese coastal fisheries can be said to have been concentrated on modern family managements.

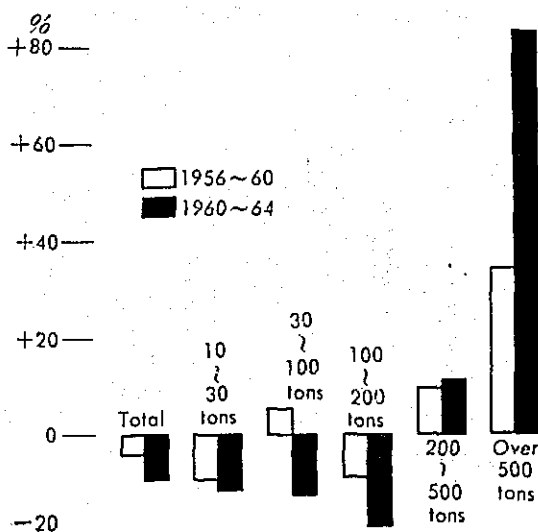
The decrease in the number of managements of offshore and pelagic fisheries was very sharp compared with the former, because they depended largely upon employed labor (Fig. 8). Though the number of large fishery managements operating with fishing vessels over 200 Ts made a rapid increase, that of smaller managements showed a sudden decrease. Such tendencies were very remarkable in the period of 1960-64 when a sharp decrease occurred in the number of fishery workers. As to the difference by size of management, large managements operating vessels over 30-50 Ts tended to grow larger in size, while small managements operated by vessels under such tonnage tended to grow smaller.

With regard to the latest tendency of change in the size of managements, coastal fisheries have come to be operated mainly by family managements, and the scale of management of offshore and pelagic fisheries

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has been enlarged and the number of medium managements has declined, showing a change in the pyramidal structure of the fishing industry in former days.

Fig. 8 Increase and Decrease in Managements of Offshore and Pelagic Fisheries



2. Income and Wage Levels of Fishery Households

The living expenses per capita of coastal fishery households are almost equal to those of farm households, but they are very low compared with those of urban workers. Among the households of fishermen at large, the living expenses of aquiculture households have reached a reasonable level while the level of those of boat fishery households is low (Table 10). Even though the level of living expenses of coastal fishery households is low compared with that of urban workers, with the increasing tendency since 1960, the disparity between the two groups is being reduced.

Table 10. Annual Living Expenses per Capita of Fishery Households and Households of Other Industries

	(Unit: 1,000 yen)					
	1960	1961	1962	1963	1964	1965
Coastal fishery households	59	70	80	89	103	113
Boat fishery households	54	68	74	83	97	106
Culture fishery households	77	88	98	110	124	128
Farm households	61	69	78	89	101	115
Urban worker households	86	98	109	124	135	147

360 yen = \$1.00

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The Fisheries Agency, for the purpose of increasing the incomes of coastal fishery households, is pushing on a consistent policy for absorbing small-income boat fishery households into culture in shallow seas. The New Economic Program intends to adopt the latest improved techniques of culturing roes and fries of fish and shellfish, and to breed them in coastal fishing grounds so as to promote the "farming" of the coastal waters of the whole country. With the development of the New Economic Program it is believed that the coastal waters will be cultivated for fishery purposes as in case of agriculture. Further, the small boat fisheries scattering along the long coast will be brought together in several fishing port areas and the modernization of their management will be undertaken with well-equipped facilities for production and distribution. Though the decline of coastal fisheries has been anticipated by many people, there is now a bright prospect of their future through the recent development of fishery techniques encouraged by the government.

With regard to the wage level of offshore and pelagic fishery workers, compared with the annual wage per capita of workers in manufacturing plants on land with 5 to 29 workers which was ¥401,000 (¥360=\$1.00) in 1965 and that of those engaged in plants with over 30 workers which was ¥532,000, their wage is higher than that of the former, but is lower than that of the latter (Table 11). Owing to the recent shortage of labor

Table 11. Annual Wages per Capita by Size of Managements

	(Unit: 1,000 yen)			
	1962	1963	1964	1965
Average	298	403	446	543
10~ 30 tons	183	226	260	316
30~ 50	304	373	376	433
50~100	289	355	416	515
100~200	351	426	501	592
200~300	410	507	502	670
500~	574	653	696	795

power, the level of wages has been sharply raised. But in view of the extended fishing voyages and working hours and the risk of life on board, it can be said that the workers in these fisheries should be paid higher wages by 20 to 30% over those of workers on land.

A special feature of the wage of fishery workers at large is the difference between large and small managements, which is brought forth by the difference in the size of managements and in the productivity of labor. For example, in 1965 the annual wage of workers on board fishing vessels of 10-30 Ts was ¥316,000 on the average, while that of workers on board fishing vessels over 500 Ts was ¥795,000, showing 2.5 times over the other.

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Since it was 3.1 times in 1962, it can be said that the disparity has come to be reduced. But there is still a great difference in the wages between the two groups because of the difference in labor productivity by the size of management.

In the New Economic Program, again, for the purpose of carrying out a smooth development of offshore and pelagic fisheries, it is emphasized that the target of modernization of fishery managements should be settled in connection with the production, number and tonnage of boats, and the labor power to be needed in the future, and for the purpose of attaining the target, the necessity of carrying out the combination or amalgamation of managements is also emphasised.

Chapter II

Management of Fishery Resources

Section 1. Characteristics of Fishery Resources and Fishery Management

It had been a common idea that, because the sea has an immense expanse of water and rich fertility, marine fishery resources were inexhaustible. But with the increased population of fishermen and the improvement of fishing techniques the fishing efforts have been augmented and fears have come to be entertained for the security of fishery resources unless any appropriate conservation measures are taken.

Even though fishery resources have regenerative power of their own, they are exhausted if exploitation exceeds a certain limit. This limit of exploitation is commonly called "maximum sustainable yield", which is the target of the management of resources from the point of biology. In view of the actual situation, however, many boats operate in the same fishing ground to take same kinds of fish and they are different from one another in their size and fishing methods or techniques. These factors are liable to stir up disputes on the sea. Further, because fishery resources are open to the public as a rule, as the proverb says, "First come, first served", fishing boats equipped with backward fittings are driven out of the fishing ground. But it must be noted that because the quantity of fishery resources is not easy to be increased artificially, investment competition does not always obtain the anticipated result and that such investment is apt to grow the waste of capital and labor.

It may safely be said that the history of fishing industry of the world is that of the disputes among the groups of fishermen who had disparity in the size of boats and in the efficiency of fishing methods relating to certain fishery resources. For the purpose of conserving fishery resources and adjusting the confronted interests between fishermen, various forms of management have been adopted from olden times all over the world. The forms may be classified as follows:

- (1) Regulation on the maximum size and age of fish to be caught (Protection of fry and fingerling)
 - a. Direct regulation on lengths and age of fish;
 - b. Regulation on mesh-sizes;
 - c. Establishment of closed fishing grounds and seasons.
- (2) Regulation on fishing efficiency
 - a. Regulation on specified fishing gears and methods;

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- b. Regulation on the number, size and tonnage of fishing boats and number of fishermen;
- c. Regulation on fishing grounds and seasons.

(3) Regulation on catch amount

In the actual enforcement of fishery management, some of these regulations are put into practice in combination. Of these three forms, (3) can be said the most immediate and simple form for attaining the maximum sustainable yield. This method was applied to the halibut fishery in the Pacific coast of North America and was highly valued as one of the most successful fishery managements. But according to the latest research, when (3) form be adopted, fishermen will be tempted to make an over-investment to increase their own shares and it may prove an ineffective investment from the point of economy. Such method is not suitable from the character of resources that the owners of fishery resources are not fixed and they are left to free exploitation. In short, even the most suitable method of fishery management from the point of natural science is not always the best fishery management method from the point of economy. From the economic point of view, the method for maximizing the output of fishery against its input, namely, the method for maximizing the rent from fishing grounds, is considered the most pertinent. For this purpose, it is absolutely necessary to regulate the number of fishing boats and fishermen.

It is almost prevailing opinion among scholars in the world that the fishery management be discussed not only from the point of natural science but also from the economic point of view. From these points, the regulation specified in (2)b, namely, regulation on the number, size and tonnage of fishing boats and number of fishermen is a very effective way of carrying out the fishery management.

The paper submitted by FAO "Economic Aspects of Fishery Management" to the Annual Meeting of International Commission for the Northwest Atlantic Fisheries in July, 1966 states as follows: "One general conclusion emerges from all of the studies. The logic of the argument that unrestricted entry to a marine fishery by private firm will inevitably lead to continuing over-capacity, inefficient use of labor and capital, and (if price-cost ratios are very favorable) overfishing severe enough to pose a threat of serious physical depletion is confirmed. Moreover, the amount of economic waste appears sufficiently large in the case of high-valued fisheries such as halibut and salmon to warrant serious concern. Since this seemed to be a matter of general agreement at the meeting, the point need not be labored further."

Section 2. Fishery Management in Japan

In contrast with the backwardness of live-stock farming, the fishing industry began to make an extensive development from feudal days and fishermen were found in any coastal village. Feudal lords granted fishery rights to villages and ordered them to manage coastal fishing grounds. At the same time, the lords allowed any person to exploit freely fishery resources in offshores. About 200 years ago, however, with the advance of coastal fishermen to the more distant part of the sea with their enlarged boats, the feudal lords allowed the fishermen to organize fishery guilds and after paying the corresponding taxes, granted them exclusive fishery rights to operate offshore fisheries and coastal fisheries on large scale.

With the crowding fishermen in the same fishing ground, fishery disputes occurred frequently between fishery guilds and coastal villages, and similar disputes occurred between small coastal fishermen and large offshore fishermen. In those sailing-vessel days even large offshore fishermen used to operate fisheries not very far from the coast.

For the purpose of preventing such disputes and stabilizing the tax revenue, the lords undertook a positive management of fisheries which involved almost all the management forms already mentioned. The main point of the management is the restriction on the number of boats to be operated in fishing areas. With regard to the number and size of boats to be operated, the number of fishermen to be engaged in fisheries and others, an agreement was made within the village and between villages concerned all over the country.

By the Meiji Restoration in 1868, the feudalistic society of Japan was oriented to modern society. But the fishery management in coastal villages was adopted in the modern Fisheries Law as it was. With regard to the use of fishing grounds along the coast, since it had been permitted to fishermen from olden times, the new law prescribed it as fishery right which has almost the same nature as that of ownership prescribed in the Civil Law. As to the use of offshore fishing grounds, it was included by the law in the fishery license which is granted to fishermen who have the prescribed qualifications, while those fisheries that have no fear of raising disputes among fishermen were included in free fishery open to any person.

1. Fishery Right

Fishery right implies three types of right: fixed-net fishery right, demarcated fishery right and common fishery right. Fixed-net fishery right is a right granting the operation of fisheries by the use of fixing gears. Demarcated fishery right is the right granted to operate fish culture industry by demarcating sea areas with stones, tiles, bamboos or

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trees. Common fishery right is a right granting for operation in a specified coastal water.

The qualifications for the persons who can apply for these rights are specified by the Fisheries Law. With regard to fixed-net fishery right and demarcated fishery right, even a private person if qualified can be the subject of the right, but as to common fishery right, it is exclusively granted to fishermen's cooperatives. Even in the granting of the former two fishery rights, the priority order is provided for in the Fisheries Law, and fishermen's cooperatives or fishermen's organizations associated with the cooperatives have the top priority.

2. Fishery Licenses

Fishery license is granted chiefly for offshore and pelagic fisheries. But even for coastal fisheries, license is needed for those operated to take fish groups having a strong migratory nature. For example, as in the case of purse seine fishery of small type, its fishing grounds vary according to day and season and many boats flock together in the same fishing ground. Furthermore, since the fishery itself is unstable, it is not proper from the nature of this fishery to place strict restrictions such as to make it a right fishery and fix its fishing grounds. As to such fishery, when required to conduct conservation of resources or fishery adjustment, it is usually regulated by fishery license system.

There are two types of fishery license; one is granted by the Minister of Agriculture and Forestry for the large or medium scale management and the other is granted by the Governor of the prefecture for those of small scale managements. In the granting of prefectural fishery license, the Government fixes the number of fishing vessels to be operated, their tonnage and fishing methods in the whole country and allots the respective shares to the prefectures in many cases. Within these shares, fishery licenses are granted to fishermen and fishery organizations by the Prefectural Governors.

3. Free Fishery

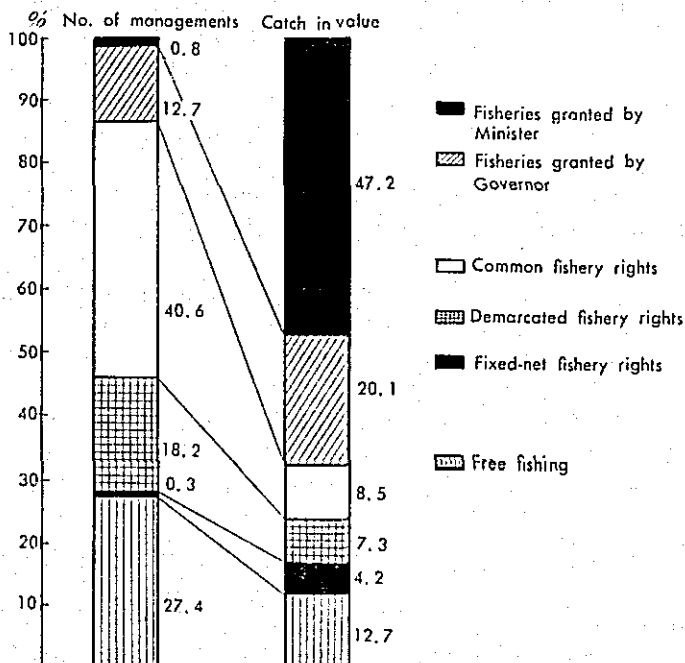
This is a fishery which can be freely operated by any person. But there are some free fisheries which must be approved by the authorities. Such measures are taken to know the actual conditions of the fishery which are of use when free fishery is shifted to license fishery. For example, even though saury stick-held dipnet fishery and squid angling are important fisheries in Japan, they are now treated under approval system.

With regard to the percentage of the managements which hold fishery licenses or fishery rights and their production, the Second Fisheries Census in 1958, though rather old information available, clarifies as follows:

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The percentage of the managements holding fishery licenses is 13.5% of the total with their production in value occupying 67%, and that of the managements holding fishery rights is 60% with their production in value of only 20%, while the percentage of the production in value by free fisheries is 12.7% (Fig. 9). In view of the enlarged scale of the offshore

Fig. 9 Relative Importance of Number of Managements and Catch in Value (1958)



and pelagic fisheries after 1958, it appears that the percentage of license fisheries has been heightened ever since.

The most specific characters of the system of fishery right and license as means of fishery management are to directly regulate the number of fishermen and boats to be engaged in fisheries and to attach necessary conditions on the fishing method, gear, season and others in the grant of fishery right and license, and also to be able to take a strong action to revoke the fishery right or license in case of violation of the regulations or conditions.

Based on the Memorandum of the Occupation Forces, the reformation of fishery system was enforced in 1949. Its objective was to establish a democratic fishery system by cancelling the fishery rights of big capitalists who had been monopolizing these rights for a long time and granting them to working fishermen.

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The traditional fishery rights and licenses were annulled, and then they were redistributed to fishermen by the State. In the course of this reformation, the State purchased the fishery rights and for the purpose of raising the money required therefor undertook to collect levy from the fishermen in the grant of rights and licenses. But this levy system was met with a strong opposition from fishermen and was abolished in 1951. Even though the direct regulation of fishery entry is deemed the best way of conserving fishery resources and managing fisheries, restricted entry will induce rent; and such rent should not be reverted to individual persons, but it should be received by the State for the purpose of conserving and propagating the resources. In the existing circumstances, however, the collection of rent is a rather difficult matter under the democratic government.

For the purpose of supplying the shortage of foods after World War II, the government hastened to augment the fishing fleet, but the MacArthur Line disturbed the augmentation. Consequently, the unbalance between fishing grounds and fishing efforts became great, especially for trawl fisheries. The Japanese government made petitions to the Headquarters of Occupation Forces for the extension of fishing areas, but the Headquarters gave orders to reduce by 30% the number of the trawlers which were excessively operating in the East China Sea and Yellow Sea, in prior to the proposed extension of fishing areas. The government, under the orders, effected the reduction of fishing boats by purchasing excessive ones in 1950 in the following ways:

- (a) Invitation of the owners who wish to sell their boats be made first of all;
- (b) When the number of boats offered does not come up to the full number, the cancellation of fishery license be made for those boats which violated the regulations on fishery license and others, or the offering of excess boats by the owners who have many boats be requested.

This 30% reduction of fishing boats through the purchase by the State was also applied to small trawlers in coastal waters from 1951 to 1953.

Such drastic measure could only be taken by the provisions of the restricted entry under the Fisheries Law and by the imperative order of the Occupation Forces.

After the effectuation of the Peace Treaty in 1953, tonnage supplement system was adopted in place of purchasing system. For example, in case of reduction of trawl fishery boats, no new fishery license was granted, and when any new fishery or fishing grounds were developed such as salmon-trout fishery in the North Pacific Ocean or tuna fishery, license can be applied for that fishery on the condition that the applicant

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should surrender his license for trawl fishery.

In this way, the medium trawl fishing boats in the Japanese off-shore waters which amounted to 1,527 in 1955 decreased to 1,100 in 1966. Such fishery adjustment is a foundation of the Japanese fishery policy applicable not only to trawl fishery but also to other fisheries.

Section 3. International Fishery Management

Fishery management for fishermen in a country can be conducted comparatively easily only by regulating the size of fishing boats, types of fishing methods, etc., but the fishery management between foreign countries is very complicated because of the difference in the standard of appraising price system, labor power, use of fishery products and others. Accordingly, for the special stock such as fur-seal, salmon and whale, international conventions are concluded respectively. But in view that such international fishery managements are not enough for the purpose, the necessity of enforcing the fishery management in the whole sea area has come to be keenly felt in these days.

Before World War II Japan did not join any international fishery convention except the Convention for Salmon Fishery between Japan and Russia, but after the War it has come to positively conclude international conventions. The major conventions are as follows:

1. International Convention for High Seas Fisheries of the North Pacific Ocean (Japan, Canada and United States of America), Entered into force, June 1953
2. Convention for King Crab Fishery between Japan and United States of America, Entered into force, October 1964
3. Interim Convention on Conservation of North Pacific Fur Seals (Canada, Japan, Union of Soviet Socialist Republics and United States of America), Entered into force, October 1957
4. Convention for High Seas Fisheries in Northeastern Pacific Ocean between Japan and Union of Soviet Socialist Republics, Entered into force, December 1956
5. International Convention for the Regulation of Whaling (Canada, Chile, France, Japan, the Netherlands, Norway, Peru, Union of Soviet Socialist Republics, United Kingdom of Great Britain and Northern Ireland, United States of America, etc.; 17 countries in all), Entered into force, November, 1953
6. Agreement on Fisheries between Japan and the Republic of Korea, Entered into force, December 1965
7. Arrangement for the Regulation of Antarctic Pelagic Whaling (Japan, USSR and Norway), 1966

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Further, Japan is planning to join in the International Convention for Tuna Fishery in the Atlantic Ocean, and is also sending observers to the Eastern Pacific Tropical Tuna Committee, with the intention of cooperating in the enforcement of the agreement when concluded.

After World War II, especially after 1955, for the purpose of meeting the increased demand for fishery products and of obtaining foreign currencies, the Japanese fishing industry positively embarked upon the development of fishery resources in the high seas. At the same time Japan, for the purpose of the development of unutilized and unexploited resources, has carried out fishery technical assistance and contributed to the prosperity of the developing countries which are confronted with food problem and are eager to develop fishing grounds in their coastal waters. Under such situations of the world, Japan, on the principle of coexistence, will cooperate in the development of fisheries of other countries hereafter and positively join international fishery agreements.

Section 4. Conservation and Propagation of Fishery Resources

With the recent development of industries on land and the marked increase of population in cities and towns, rivers and waters in coastal areas have come to be greatly polluted by sewage from plants and houses; and such water pollution is naturally producing a bad effect on fishery resources. Plants, large and small, in Japan concentrate in seaside districts, and the damage by water pollution on coastal fishery resources is showing an increasing tendency year by year.

For the purpose of conserving the water quality, in 1958 the government established following two laws;

Law for the Conservation of Water Quality in Public Waters, and
Law for the Regulation of Waste Water of Factories.

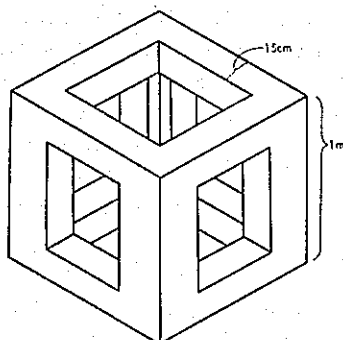
In 1965, prefectural governments began to have special patrol officers to inspect the water quality in their areas.

In the growing area of fingerling or young shellfish, closed fishing grounds and seasons are provided and they are designated as reserved waters to make special protection from exploitation.

In parallel with the abovementioned regulatory measures, several measures for propagating fishery resources are positively being taken. From the feudal days, for the purpose of inviting fish, fish nests have been made by fishermen in the coastal waters submerging overage boats, stones or trees. Now with government subsidies, fishermen's cooperative associations are building fish nests. Fish nests of small type are those built by submerged mass of stones piled up while those of large type are called "fish apartment house" constructed with submerged concrete blocks of as many as several thousands (Fig. 10.) It has been intended that

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Fig. 10 Fish Apartment or Large Fishnest (Concrete block)



these fish apartments provide fish with their residence, increase fishery resources and make a contribution for making good fishing grounds, but it is difficult to confirm their results because they are at sea bottom and is bringing out the problem on the efficiency of investment.

Saweed farming project is being promoted by blasting rocks at the sea bottom, by scraping the surface of rocks, or by making wall of concrete on the surface of rocks.

Large type improvement project of farming grounds is being carried out by the Fisheries Agency by the increased circulation of sea water through the ditches made in parts or at the bottom of bay or by building breakwaters with concrete piles.

The fish spawning and stocking project which was initiated with salmon and trout ninety years ago is now in operation in a through process from taking-out of eggs, spawning to adult in the farming of sea fish as well as of river fish. The farming of prawn, lobster, crab, abalone, top-shell, urchin, octopus and seabream has been commercialized.

The Fisheries Agency established several years ago four fish culture centers in the Seto Inland Sea to positively increase marine fishery resources.

The mainstay of culture industry in the past was the culture of pearl, laver, oyster and 'hamachi' (young yellowtail). With regard to the future prospects of the culture of these fishes, that of pearl, laver and oyster is very hopeful, but as rafts are used in their culture and suitable places are limited, their farming grounds can not be extended. As to the culture of 'hamachi', since it is expensive and consumes a great amount of feed (small sardine and horse mackerel) as much as 8 times of their body weight when marketed, its great development in future is still far. In such countries as Japan where the demand for fishery products is very high, it is considered to be best to utilize the resources of

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low class fish by refining and extracting albumen and use as processed food.

From these points, it can safely be said that the mainstay of culture in shallow sea in the future is the culturing of the most fitted resources making use of the potentially rich coastal waters following the examples of successful experimental culturing of prawn, abalone, etc. already conducted. For this purpose, fishermen's cooperative associations should carry on the culturing work by themselves providing good facilities for collecting and breeding seed fish and thereby attain the increased fishery resources in their coastal waters, namely, the coastal waters should be made their farming yards as in case of agriculture.

There is an indication that the Japanese coastal fishery is now taking a new course.

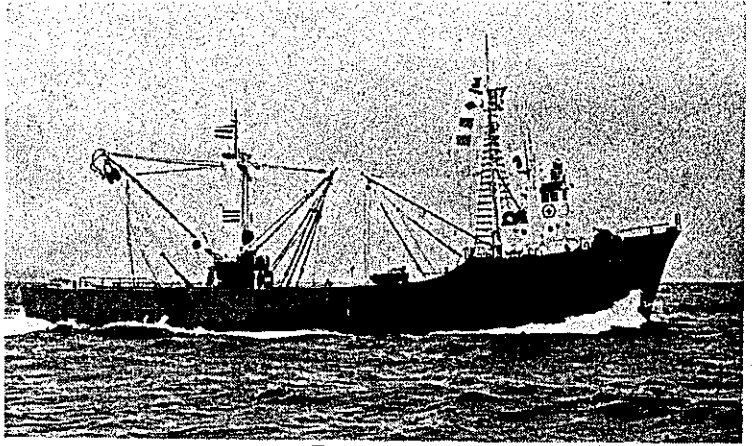


Morning Glow of a Small Fishing Port in the Seto Inland Sea

The small fishing boats in the port are small trawlers drying their nets on board. This port-type is a typical small anchorage which can be seen in the seashore all over the country.

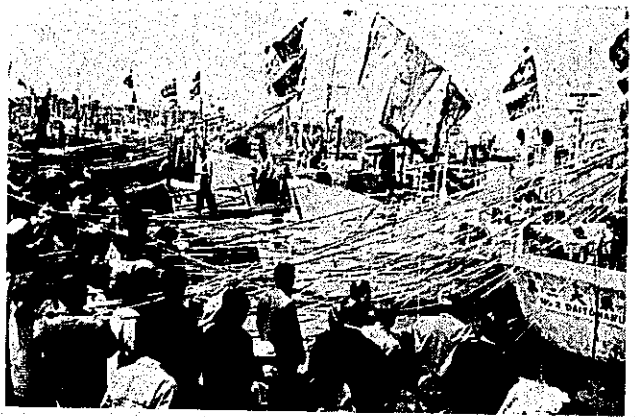


Scenery of a row of fishermen's houses in a small fishing village from a hill.



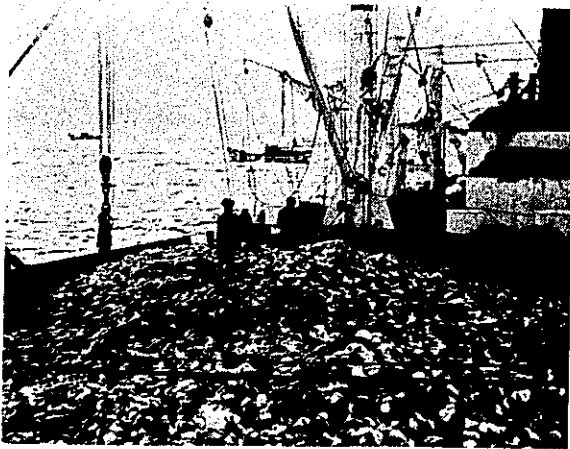
Purse Seiner

An efficient fishing vessel of 250 Ts class with powerblocks at the bows.



Sailing-out Scene of Fishing Fleet for the Northern Pacific Ocean

The catchers of 70~80 Ts sailing out for a long voyage for 10 months are being given a hearty send-off by families and well-wishers.



Fishing Fleet operating in the Northern Pacific Ocean

Bottom fishes taken on board. They are carried to fishmeal plants in the ship to be processed.

Chapter III

Development of Fishery Production Means

Section 1. Fishing Boats

1. Change in Number of Vessels

Japanese fishing fleet craft at the end of 1964 was composed of 392,000 vessels, their gross tonnage being 2,179,000 Ts. When divided into two groups boats operated in the sea and those in inland waters, the former was 371,000 while the latter was 21,000 in number, and 55% of the sea going boats and 18% of the boats operated in inland waters were powered. The total percentage of powered boats was 53% while the rest were non-powered boats (47%).

When looking back upon the change in the force of fishing boats over a pretty long period of time, their total tonnage and boats in 1940 were 1,102,000 tons and 354,000 vessels. During World War II, however, the majority of fishing vessels of large and medium sizes were mobilized by the army and most of them were destroyed, and those operated in coastal waters were also hard hit by air raids. The total number of fishing boats at War's end, in 1945, dropped to 279,000, which means 21% decrease in their number, and 50% decrease in their tonnage.

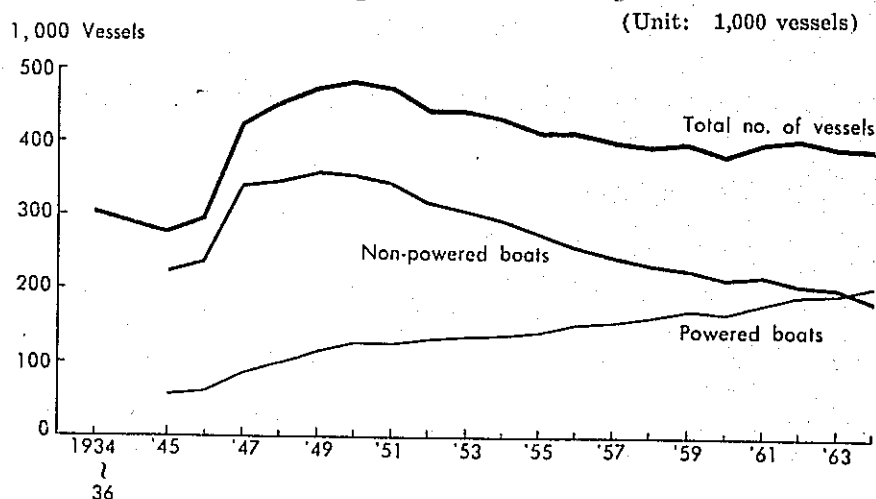
After the War in order to overcome the dire shortage of food, the repair work on the remaining boats were speeded up in the face of many obstacles, such as short supply of construction materials, etc. The restoration of the fleets, financed under the government's increase of food production policy and by the abnormal economic condition such as the fishing boom brought about by the shortage of food during several years after the War, was also promoted, and in five years the increase in number of vessels attained a high level. But owing to the tight money policy taken by the government in 1950, the increasing trend in their number was checked, as such they reduced in number as from 1950.

One of the striking points of these changes is as indicated in Fig. 11. There is an increasing tendency in the number of powered boats while there is a declining tendency in that of non-powered boats. This shows that the gradual decrease of resources in coastal waters is driving fishing vessels into offshore and pelagic waters.

The number of fishing boats after the War reached the record high in 1950, when the percentage of the two groups was 73% in non-powered boats and 27% in powered boats. But in 1960 their percentage changed to 56% and 44% respectively. Then at the end of 1964 the percentage of

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Fig. 11 Change in Number of Fishing Boats



powered boats went up to 53%, and such a tendency is expected to continue in the future.

The increase of powered boats has been brought forth together with the modernization of producing means and facilities such as use of propulsion engines, steelification of hull, enlargement of size, and equipment of improved fishing.

The outline of the development of Japanese fishing boats is as follows:

2. Fishing Boats by Types of Fishery

The majority of fishing boats being operated in coastal waters belong to small-type boats under 10 Ts. The number of powered boats in coastal waters is about 187,000, which occupies approximately 91% of those being operated in the sea, and it is made up as follows (in 1964):

	No. of boats
(a) Boats operated for collecting shellfishes and sea weeds and their culture in shallow seas	32,600
(b) Pole and line fishing boats	59,000
(c) Gillnetters	18,000
(d) Small trawlers	17,300
(e) Long-line fishing boats	16,300
(f) Others	43,800

The increase rate of (a) in the past ten years is about 4 times, that of (b), 72%, that of (c), 2.2 times and that of (d) 8%, but that of (e) is very small. The big increase in the number of boats operated for col-

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lecting shellfishes and seaweeds is due to the recent trend of converting to the outboard motor boats.

Fishing vessels of large and medium types engaged in offshore and pelagic fisheries are those operating trawl fishery, tuna and skipjack fishery, purse seine and others. The number of these vessel in 1964 is made up as follows:

	No. of boats
(a) Trawlers (large and medium types)	3,105
(b) Tuna and skipjack pole and line vessels	2,677
(c) Purse seiners	1,280
(d) Haulnetters	405
(e) Liftnetters	277

As to the change in these ten years, the number of tuna and skipjack fishing vessels increased by 65%, but vessels of other fisheries decreased. With regard to trawlers, however, though their total number decreased by 7.8%, that of large trawlers increased by 2.7 times.

It is to be specially noted here that the number of vessels other than some particular ones is on the decrease while that of large sized vessels is on the increase. These trends have been brought forth not only by the fluctuation of fishery resources but also by the recent shortage of labor and steep rise in wages which have induced boatowners to give priority for the management of such fisheries as operable efficiently by economising in labor.

3. Enlargement of Vessels

During the period from 1954 to 1964, the total tonnage of powered vessels in the sea increased by 100%, that is; from 985,000 tons to 2,024,000 tons, and the average tonnage per boat also went up from 7.2 to 9.9 tons. When examined by groups of size, the group of boats under 5 tons which occupied 80% of the total in 1954 came to occupy 87% in 1964, showing a remarkable increase in the number of small boats (Table 12).

The reason why the average tonnage per boat increased in spite of the increase in number of small boats is either converting to a small boat or to a bigger one as specified in Table 12 and the decrease in the number of medium fishing vessels of 5 to 30 Ts. The reason for the decrease in number of medium sized vessels is that these vessels are half-way between large and small and are not suitable either for coastal fisheries or offshore and pelagic fisheries. Thus the trend is for medium sized boats to either convert to the lower or higher tonnage class.

It is to be noted here that non-powered boats with outboard motors have come to be classified as "powered-boats" for the purpose of fisheries statistics and thereby their number has risen to 28,000 vessels.

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Table 12. Change in Number of Powered Fishing Boats in the Sea by Tonnage

	End of 1954 (A)	End of 1964 (B)	Increase or decrease	(B)/(A) × 100
Powered boats in the sea	137,080 vessels	203,718 vessels	66,638 vessels	148%
0~ 4.9 tons	110,521	178,446	67,925	161
5~ 9	10,187	8,127	△ 2,060	80
10~ 14	4,736	3,896	△ 840	82
15~ 19	4,595	3,216	△ 1,379	70
20~ 29	1,733	1,615	△ 118	93
30~ 49	2,402	3,171	769	132
50~ 99	2,314	3,510	1,196	152
100~199	349	672	323	193
200~499	191	805	614	421
500~999	31	112	81	361
1,000 tons and over	21	148	127	704

Note: △ decrease.

The other distinctive feature in these ten years is the great increase in the number of vessels of large type; especially the number of vessels over 1,000 tons which has increased by 7 times, those of 200-500 tons by 4 times and those of 500-1,000 tons by 3.6 times. Even though the vessels from 30 tons to 200 tons did not show such striking increase, they recorded an increase of 30 to 90%.

When examined by types of fishery, the average tonnage per vessel of large trawlers which was 384 tons in 1954 went up to 918 tons in 1964. With regard to large trawlers over 1,000 tons, their number went up very fast and came to occupy 32% of the large trawler group in 1964. The average size of tuna fishing vessels increased from 90 tons to 130 tons, and that of salmon net fishing vessels also went up from 13 tons to 29 tons.

4. Increase of Steel Vessels

There is a remarkable trend seen in the conversion of construction of fishing vessels from wood to steel. During these ten years from 1954 to 1964, the percentage of steel powered vessels went up from under 7% of the total number of 28% of total tonnage to 18.5% and 60%, respectively.

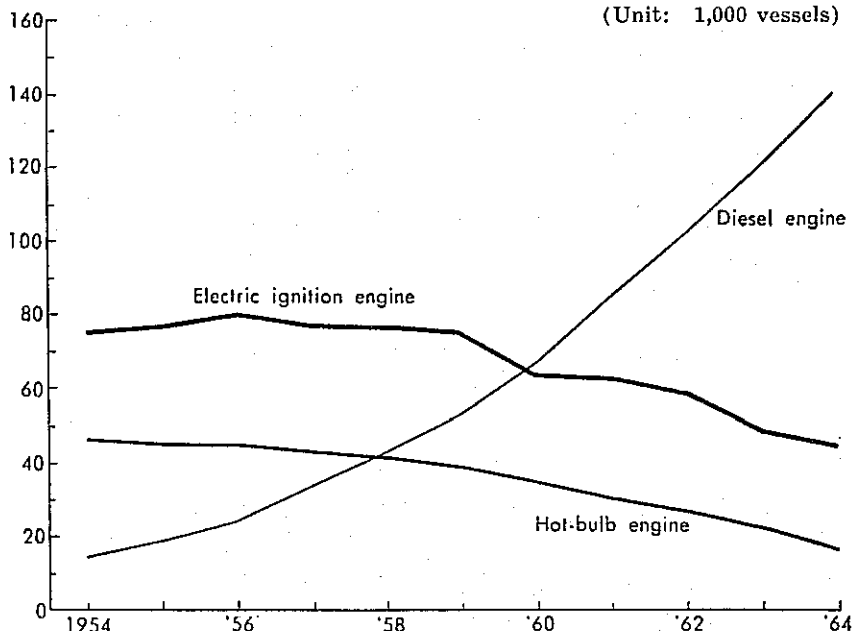
All fishing vessels over 50 tons now in construction are of steel, showing a great improvement in the quality of Japanese fishing vessels. Those under 10 tons mostly constructed of wood in the past from the point of cost have come also to be built of steel or plastic because of the recent shortage in the supply of wood and the decrease in number of boat-builders, which means a great technical innovation in the building of small boats.

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5. Improvement of Screw Propellers

With the increase in size of vessels, a significant change has occurred in the horse power and type of propulsive engines. The average horse power per vessel increased in these ten years from 19.1 hp to 26.5 hp and the total horse power of vessels increased from 2,629,000 hp to 5,406,000 hp, showing an increase of over two times.

1,000 Vessels Fig. 12 Change in Number of Vessels by Types of Engine
(Unit: 1,000 vessels)



With regard to the types of engine, as indicated in Fig. 12, the number of boats equipped with electric igniters and hot-bulb engines decreased, while a great increase is seen in the number of boats equipped with Diesel engines. The percentages of these three types of engines in 1954 were 12% for Diesel engine, 33% for hot-bulb engine, and 55% for electric igniter, but in these ten years, the number of boats equipped with Diesel engines increased from 14,000 to 141,000, showing a sharp increase of about 10 times, but that of boats with hot-bulb engines or electric igniters decreased to 37% or 60% of that in 1954, showing a large decline in their number. Consequently, their percentages in 1964 changed as follows: Diesel engine to 70%; electric igniter to 22%; and hot-bulb engine to 8%.

Such speedy increase in the use of Diesel engines in these years is not only due to the increased use of engines suitable for large vessels, but

also to the extensive use of small sized ones for small boats under 10 Ts. In 1964, over 60% of the small boats were equipped with Diesel engines.

With the high economic development in the country, fishery labor power has greatly been absorbed into other industries and the coastal fisheries have come to suffer from the lack of man power. And naturally even the fishing industry in coastal waters has come to be converted from the labor intensified industry to the capital intensified industry. As to the engines of fishing boats, they have been converted to Diesel engines which are high in efficiency, small in size, light in weight, economical in fuel cost, and easy to handle. Owing to these advantages, Diesel engines have come to be used even in small coastal fishing boats.

Further, the development of the following works has been conducive toward the improvement of fishing efficiency, labor saving and reduction of working hours:

- (a) Use of superchargers (waste gas turbines) and variable pitch propellers;
- (b) Operation of engines by remote control equipments;
- (c) Automation of engine appurtenances;
- (d) Conversion of electric current from direct current (D.C.) to alternating current (A.C.).

Section 2. Improvement of Fishing Nets

Fishing nets are made of natural or synthetic fibres. Before World War II, fishing nets in Japan were all made of natural fibres such as cotton and hemp. It is a revolutionary event that almost all fishing nets in Japan have been converted from natural to synthetic fibre nets in a very short time. Synthetic fibres have taken the place of natural fibres not only in fishing nets, but also in ropes, fishing lines and canvas.

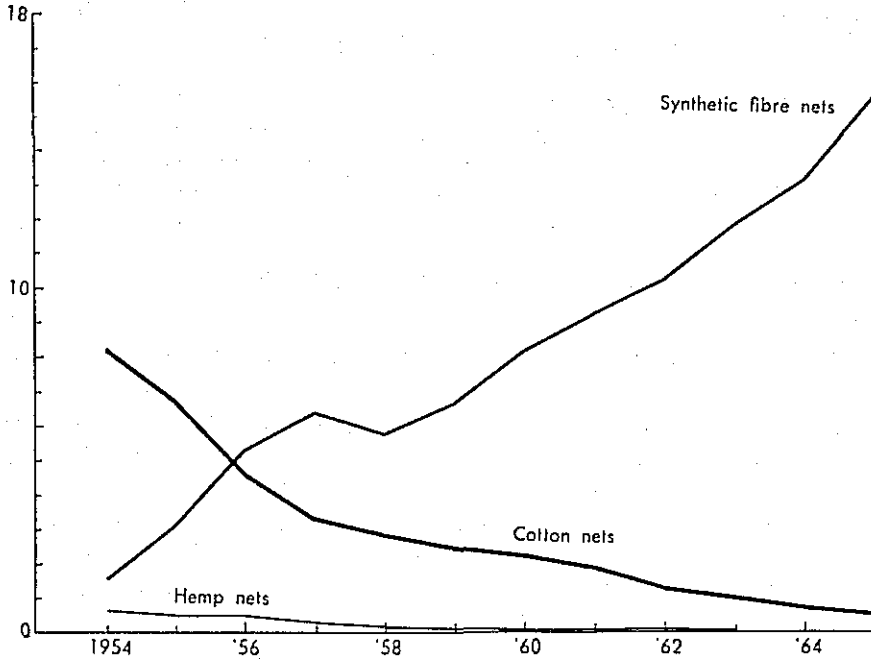
As indicated in Fig. 13, the initial use of synthetic fibre as material of fishing net was made around 1950. In a few years afterward, in 1956, the use of synthetic fibre nets began to occupy about half the amount of the total, and with the speedy increase year by year afterward, the use of natural fibre decreased to less than 10% of the total amount in 1963 and in 1965 it recorded 96% of the total use of fishing nets against 4% for natural fibre nets. Now natural fibre is nearly out of use for fishing nets.

Natural fibre fishing nets are easy to decay, easy to absorb moisture, weak to friction, hard to handle in fishing because of increased heaviness in water, not handy for storage and maintenance and short in durability. Furthermore, owing to the insufficient local supply of natural fibre materials in Japan, fluctuations in their import prices always disturb the stabiliz-

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Fig. 13 Change in Production of Fishing Nets

(Unit: 1,000 tons)



ed management of fisheries. Synthetic fibre fishing nets, on the contrary, since their first use, have rendered the following merits:

- (a) The toughness of fibre has not only reduced the possible damage of nets but also improved the catching efficiency by making it possible to decrease the number of thread and mesh size. Further, these strong nets have come to be easily hauled up by machine.
- (b) Because of reduced weight of nets, the fishing operation such as casting and hauling of nets has become much easier. Moreover, the stability of vessels operating with large nets such as purse seine has been improved;
- (c) Because of strong resistance to corrosion, drying and dyeing have become unnecessary.

These merits of synthetic fibre nets have made a great contribution for economizing fishery labor, improvement of fishing efficiency and extending the durability of nets.

Among synthetic fibre nets, nylon nets began to be used most widely first for salmon fishing which especially requires strong nets, then after 1956 other new synthetic fibre nets such as vinylon, polyethylene and other nets have come to be used for coastal fisheries and others. In

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this way, the development of various kinds of new nets suitable for respective purposes have been undertaken. And now there is a keen competition among these synthetic fibre nets in their use. The production of these nets in 1965 may be rated as follows:

Nylon nets	58%
Vynylon nets	23
Polyethylene nets	11
Vinylidene nets	5
Polyester nets	3

The aptitudes of these nets to fisheries are as follows:

- (a) Nylon nets, which are made of fine and tough fibres, have proper elasticity and coefficient of expansion and is fit for gillnet fishery.
- (b) Vynylon nets, which exhibit expansibility in water and contractibility on land, are not advantageous for their use in fishing gear, and their use declined for a time. But with the recent irradiation of such disadvantages, they have come to be used for purse seine and liftnet fisheries. Because of cheapness, they will be used widely also for other fisheries in the future.
- (c) Polyethylene nets, which are not only small in gravity but easy to expand in the sea but also easy to cast and haul up, are used mainly for bottom dragnet fishing and trawling.
- (d) Vinylidene nets, which are not only large in gravity and fast in sinking but also maintain their shape against current, are used for purse seine and fixednet fisheries. They are most fitted for the purse seine fisheries of skipjack, tuna, horse mackerel and mackerel whose shoals are large and have strong swimming power.
- (e) Polyester nets, which are large in gravity, are used for purse seine fishing together with vinylidene nets, though not very widely at present.

In this way, various types of fibre net are used in the Japanese fishery, and further studies will be continued in this field for the improvement of fishing operations.

With regard to the use of synthetic fibre ropes instead of hemp ropes, there has been no fast development. But owing to the recent rise in the price of hemp materials and the lack of stability in their supply and owing to the recent decline in the price of synthetic fibres, the use of synthetic fibre for rope making has increased.

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Section 3. Other Production Means

Together with the development of functions of fishing vessels and the improvement of fishing nets, new production means have been introduced in the form of refrigerating machines, radio apparatus, fish finders, etc. and made a great contribution toward fishery production.

1. Refrigerating Machines of Fishing Vessels

According to the Fisheries Census conducted in 1963, the number of fishing vessels equipped with refrigerating machines is 1,513 (Table 13).

Table 13. Quick Refrigerating Equipments

Type of fishery	Vessels	(1963) %
Total	1,513	100
Factory ship type fishery	122	8
Trawl fishery	153	10
Skipjack-tuna fishery	886	58
Others	352	24

As specified by types of fishery, 58% of the total is occupied by tuna and skipjack fishing vessels, and all large trawlers are equipped with the machines, which raise the freezing capacity, make the vessel feasible to make a long voyage by the automatic disposition of fishery products on board and increase the rate of profits.

2. Radio Equipments

The light electric techniques which were developed by the army during the War have come to be used for peace-time industries after the War and have brought forth many machineries necessary for the operation of vessels. The first object of equipment of wireless telegraph and telephone in fishing vessels was communication with the base office in case of emergency, but its object has gradually been enlarged and varied, and it is now employed for fishery production.

As indicated in Table 14, the number of fishing vessels equipped with wireless telephones in 1963 is 8,179 and that of fishing vessels with wireless telegraphs is 3,908. With regard to powered fishing boats in the sea, 0.06% of them have these wireless equipments; and as to the rate of their installation by the relative size of boats, the percentage of large and medium vessels, that is, those over 10 tons is 67%, while that of small boats is very low. Wireless communication is not only beneficial for fishery operation and production but also it does much towards finding

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Table 14. Radio Equipments for Fisheries (No. of vessels)

(1963)

Fisheries	Wireless telephone	Wireless telegraph	Radar	Direction finder	Loran	Fish finder
Total	8,179	3,908	3,463	5,983	4,372	9,278
Factory-ship fisheries	273	322	320	331	196	264
Trawl fishery	2,027	713	733	1,098	999	2,120
Purse seine fishery	1,838	322	253	680	361	1,771
Lift-net fishery (Stick-held dipnet)	201	95	88	148	92	214
Gill-net fishery	534	134	284	371	219	546
Angling, long-line fisheries (Skipjack, tuna, mackerel)	1,335	630	612	1,094	743	1,445
Others	1,971	1,692	1,173	2,261	1,762	2,918

suitable market for the catch and products on board.

The universal use of transceivers together with compact type wireless machines for coastal fisheries is rendering services to the cooperative finding of fish shoals. Generally speaking, fishing boats under 10 tons are equipped with transceivers, and medium sized vessels from 10 to 100 tons, with wireless telephones, and large sized vessels of over 100 tons, with wireless telegraphs. In order to meet with the congestion of communication caused by the wide spread of wireless machines, the communication method of wireless telegraph has been changed to single side band.

The use of radars, direction finders and lorans is also gradually being popularized. Radars are used to examine objects around vessels on sailing and to locate their direction and distance. They were formerly installed mainly in large vessels, but with a gradual improvement in size, weight and capacity, they are now widely used even in small and medium sized boats.

Direction finders are used in night navigation as well as in fishing operation in the foggy northern waters. Especially in mothership-type fisheries, this machinery is absolutely necessary to confirm the position of the mothership. Lorans are a necessary machine for fishermen to locate the position of their vessels in heavy rain, because they make it feasible to know the position by the equation of time of the electric wave coming from the land loran base, irrespective of weather conditions. So this machinery can be said to play an important part in selecting the fishing grounds.

3. Fish Finders

The detection of fish shoals was made until about twenty years ago on the sixth sense of experienced skippers or others. Since the invention of fish finders, the searching of fish shoals has been rationalized and they have reduced the loss in fishing operation. In the early stage of their

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use, the extent of their effective use was limited. But with the invention of finders suitable for the ecology of fish species and with the supply of portable finders reasonably priced they have come to be used widely even in coastal fisheries. According to the research made in 1963, 12,400 boats were installed with fixed finders while 3,800 boats had portable finders. The majority of small boats under 10 tons had portable ones and larger vessels, fixed ones.

4. Progress of Labor-saving Techniques

With the recent deficiency of fishery labor, the mechanization and rationalization of fisheries have come to be promoted speedily by the development of labor-saving techniques and improved fishing machines taking careful consideration to the types of vessels and gears. For example, remote control machinery, auxiliary engines and controllable pitch propellers have come to be used, and large oil pressure winch net haulers have come to be installed in trawl fishing vessels. Purse seiners have come to be installed with power blocks and side rollers. Further, tuna long-line fishing vessels are now using such machineries as rope reels, baby haulers, and slow conveyors. The mechanization mentioned above has been made feasible by the introduction of hydraulic machinery. In this way, labor-saving work is being developed from the rationalization of the basic part of fishing operation to the mechanization of the details of fishing process.

These improvements which were commenced with fishing vessels of large type are now being extended to small boats in coastal waters.

Chapter IV

Present Situation of Major Fisheries

Section 1. Whaling

The whaling in Japan may be classified roughly into two types according to its operation areas: coastal whaling and pelagic whaling. The coastal whaling is the one of small type operated in the neighboring waters of the Pacific coast from home bases and the pelagic whaling includes those mother-ship whalings operated in the Antarctic and North Pacific Oceans, the Antarctic whaling being the largest of all types.

1. Antarctic Whaling

It was the first time for Japan to join the international antarctic whaling expedition in 1934. The international whaling expedition in those days was already participated by two countries, the United Kingdom and Norway, with 9 and 13 fleets respectively. Japan, being the 3rd participant, sent one fleet to the Antarctic Ocean. Since then Japanese whaling fleets have participated in the expedition 28 times (excluding the period of recess from 1941 to 1946 owing to World War II), and 20 times in succession after the War.

In the history of the international antarctic whaling the most productive was the 1938-39 expedition when six countries with 34 fleets operated whaling and caught about 24,000 whales (B.W.U.). Until the 1955-56 expedition 7 countries with 19 fleets participated in the whaling. Since then a gradual decrease has appeared in the number of participating countries and whales caught, and the 1964-65 expedition was operated by only 3 countries, Norway, U.S.S.R. and Japan with 15 fleets altogether (Table 15, 16).

Table 15. Number of Fleets Operated in the Antarctic Ocean by Countries

Year	Total No.	Norway	U. K.	Japan	Netherlands	USSR
1957~58	20	9	3	6	1	1
1958~59	20	9	3	6	1	1
1959~60	20	8	3	6	1	2
1960~61	21	8	2	7	1	3
1961~62	21	7	2	7	1	4
1962~63	17	4	1	7	1	4
1963~64	16	4	—	7	1	4
1964~65	15	4	—	7	—	4

PRESENT SITUATIONS OF MAJOR FISHERIES

Table 16. Number of Whales Caught in Antarctic Ocean by Countries

Year	Total No. (B.W.U.)	Norway	U. K.	Japan	Netherlands	USSR
1956~57	14,745	6,248	2,327	3,586	678	1,181
1957~58	14,850	5,604	2,172	4,637	874	1,563
1958~59	15,300	5,822	1,869	5,037	969	1,601
1959~60	15,511	4,568	1,900	5,216	1,037	2,789
1960~61	16,428	5,199	1,456	5,979	1,011	2,782
1961~62	15,252	3,701	1,069	6,574	614	3,292
1962~63	11,306	1,380	502	6,149	457	2,812
1963~64	8,429	1,484	—	4,600	343	2,001
1964~65	6,984	1,274	—	4,124	—	1,583

Note: B.W.U. means blue whale unit stipulated by the International Whaling Convention.

The Japanese fleets participated in the 1960-61 expedition to 1964-65 expedition were 7 fleets and their catch record began to be at the top in the 1959-60 expedition and the number of fleets also began to stand first in the group in the 1962-63 expedition.

With the recent declining trend in whaling resources, however, the International Whaling Committee decided to limit the total number of catch to 4,500 B.W.U., by which the number of the Japanese whaling fleets operable for the 1965-66 expedition was reduced to five.

The Antarctic whaling in Japan is not only an important industry in itself, but also it is an indispensable means for securing the supply of animal protein food to the people. For such purpose, the whaling fleets are making every possible effort in utilizing their catch not only in the manufacture of whale oil, but also in the complete use of whale meat as food. This is the reason why the management of whaling is rather stable in the face of the recent fluctuations of whale oil market.

The regulated total limit of catch for the 1964-65 expedition was 8,000 B.W.U., of which 4,160 units were allocated to the Japanese fleets. The total catch by all whaling fleets in this expedition was 6,984 units of which 4,124 units, about 58% of the total or 99% of Japanese allocation were caught by the Japanese fleets. Besides, 3,071 sperm whales, which are out of bounds of the regulated allocation, were caught during this expedition. The Japanese whaling group consisted of 7 fleets with 73 vessels.

The total meat and oil production of baleen whales during this expedition was 257,000 tons, which shows about 6,000 tons increase compared with that of the previous year though the total number for this year was reduced by about 12%. Such phenomenon has been brought forth by the complete utilization of whale body, especially whale meat. The production from one baleen whale was 63.5 tons on an average; 20.7 tons

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for whale oil, 39.2 tons for fresh meat and 2.8 tons for salted and other items. The total production by the 7 fleets is classified as follows (Table 17):

baleen whale oil—84,000 tons; sperm whale oil—11,000 tons and whale meat—168,000 tons.

Table 17. Whaling in the Antarctic Ocean

Year	Fleet		No. of whales		Whale oil		Whale meat (Frozen, salted)
	Factory ships	Catcher boats	B. W. U.	Sperm	Whale oil	Sperm oil	
1957~58	6	68	4,637.0	2,194	88,758	18,394	91,753
1958~59	6	69	5,037.6	1,917	84,957	16,303	94,833
1959~60	6	69	5,216.7	1,400	93,715	11,199	105,789
1960~61	7	83	5,979.9	1,552	101,220	12,124	133,225
1961~62	7	86	6,574.2	1,064	117,586	7,516	175,873
1962~63	7	79	6,149.6	1,839	113,277	10,533	151,918
1963~64	7	78	4,600.0	4,706	95,376	20,416	152,250
1964~65	7	73	4,124.6	3,071	84,208	11,246	167,866

The organization of Japanese whaling fleet is different from that of other countries, chiefly because of the utilization of whale meat. The standard Japanese fleet is organized not only by one factory ship and 9 or 10 catchers, but also by one or two refrigerating boats of about 5,000 Ts and 5 or 6 carrier boats of about 1,000 Ts. Further, the fleet is accompanied by an oil tanker of about 10,000 Ts which supplies them with fuel oil.

Because of the long distance between Japan and the Antarctic Ocean, these whaling fleets leave Japan about the middle or towards the end of October and reach their whaling grounds in about 25 days. Prior to the commencement of taking baleen whales, for about a month the fleets are engaged in the taking of sperm whales. The full-scale taking of baleen whale begins in the middle of December and is carried on until the termination of whaling season in April next year or until the day on which the fixed target has been reached. In this way the Japanese whaling in the Antarctic Ocean takes about half a year including the days of both ways. Recently the whaling period has been shortened through the reduced framework for catch quantity.

2. North Pacific Whaling

The whaling in the North Pacific Ocean was operated by U.S.A., Russia and Norway from old times, and the history of Japanese whaling in the same sea goes way back to 1915 when the whaling was operated from bases of the Kurile Islands.

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Mother-ship type whaling in this area was operated by one fleet in 1940 and 1941, but it was interrupted for a while under some circumstances. Since the reinauguration in 1952 Japanese fleets are engaged in whaling every year.

The whaling season in this area is limited to summer months from June to August. Though limited in whaling months, number of vessels and amount of catch, the importance of the North Pacific whaling has increased owing to the recent decline in the Antarctic whaling. During the period from 1952 to 1953, Japan and U.S.S.R. sent one fleet each to this waters, and for 1954-1961, 2 fleets by Japan and one fleet by U.S.S.R. were operated and in 1964 Japan and U.S.S.R. increased their whaling boats to 3 fleets and 4 fleets respectively.

With regard to the production by kinds of whale, that of sperm whales surpasses that of baleen whales. Since this area is outside the area regulated by the International Whaling Convention, no limitation is placed on the number to be caught, but on their body length, regulations are provided based upon the International Whaling Convention.

The annual catch of whales in this area in recent years includes about 800 baleen whales and 2,500-2,700 sperm whales, and the production of whale oil amounts to about 30,000 tons (Table 18). In view of the short

Table 18. Production by North Pacific Whaling

Year	Fleet		No. of whales		Whale oil (ton)	
	Factory-ships	Catcher boats	B. W. U.	Sperm	Whale oil	Sperm oil
1957	2	17	800.2	1,700	12,305	12,995
1958	2	17	800.1	1,500	11,901	12,823
1959	2	17	800.33	1,800	12,821	14,417
1960	2	17	800.33	1,800	10,725	14,865
1961	2	17	800.26	1,800	12,630	13,050
1962	3	21	618.12	2,549	10,471	20,843
1963	3	21	741.0	2,700	11,994	20,715
1964	3	21	801.0	2,460	11,685	19,456

Note: Number of sperm whales is specified in actual number.

distance from Japan which saves the operating expenses of whale meat carriers and refuelling boats, the North Pacific Ocean can be said very beneficial whaling grounds. The organization of whaling fleet in this area is almost the same with that of the North Pacific whaling fleet, but is smaller in scale.

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3. Whaling operated from Bases in Japan

(1) Offshore Whaling

The offshore whaling in Japan is in operation since 1899 when the Norwegian whaling method was introduced. In former times this type whaling was operated mainly in the waters around Bonin Islands near Japan proper, but with the recent decrease in the migration of whales to these waters, the operation area has been switched over to the whaling grounds along the Pacific coast of northern Japan. The boats operated in these whaling grounds are all under 500 Ts, and their catches consist mostly of seiwhales and sperm whales. They sail out from their home bases and drag back their catches. They cover a distance of 200 miles at the most in one or two days' passage.

There are 20 whaling bases and processing places, of which 5 or 6 places are used most frequently. Four fishing companies are engaged in the offshore whaling now with 20 vessels. Their production in 1964 was 2,800 head (1,800 sperm whales, 870 seiwhales and others) and 7,700 tons of whale oil.

Though the Japanese offshore whaling is small in scale having a little number of vessels and turning out not much catch, it can be called a training center of whaling techniques and has fostered and is fostering gunners and crew of whaling vessels who play an active part in the Antarctic and North Pacific whalings.

(2) Coastal Whaling

The coastal whaling is operated by small vessels of 30-40 Ts, to mainly catch little finners, bottle noses, etc.; and since the whaling season is limited to 6 months from the middle of April to the middle of October, the whaling is operated by medium and small fishing companies as a side line with vessels of general use, not of special use. The number of vessels operated in 1956 amounted to 54, but with the gradual decline in the migration of whales toward the coast, it dropped to 18 in 1964 when the total production was 1,240 whales (301 little finners, 189 bottle-noses and others) and 626 tons of whale oil.

Section 2. North Pacific Salmon Fishery

Salmon fishery is classified into two types:

Mothership type fishing and fishing operated with drift nets or long lines from home bases. The salmon fishing in the Northern Pacific Ocean is regulated by the Japan and U.S.S.R. Fisheries Convention which entered into force in 1956. By the annual negotiation between the two govern-

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ments, the catch limit, fishing period, length of drift nets, mesh size and other items are decided. With regard to long-line fishery, the thickness of line and others are regulated.

The Japanese apportionments of catches in the five years from 1962 to 1966 in the Northern Pacific Ocean, the area of which is specified by the Convention, were as follows:

1962	.....	115,000 tons
1963	.....	120,000 tons
1964	.....	110,000 tons
1965	.....	115,000 tons
1966	.....	96,000 tons

These apportionments are determined between the two governments every year by taking into due consideration the condition of resources, the catch result of previous years, etc., and they may be adjusted by the periodical big or small catch of fish every other year.

With regard to the catch in the Northern Pacific Ocean, owing to the fishing restriction in the waters north of 45° N. from 1963 and under the strict joint supervision of the two governments, it is not growing well in recent years.

1. Mothership-type Salmon Fishery

Salmon fishing of mothership-type is the main force of the Japanese salmon fisheries consisting of a mothership of about 5,000 Ts and about 30 accompanying catcher boats of 50-90 ton class. The mothership is equipped with canning and freezing facilities and processes the catches into canned, frozen and salted goods. At the same time it supplies essential goods to the catchers accompanied. The owner of the mothership being usually different from those of catches, the two parties enter into a contract relating to the price and bargain of fish before the fishing season. The tonnage of these vessels varies from 50 to 90 Ts and they carry 20 to 25 members of crew on board.

The straightened length of drift net is about 12 km, but it is usually shortened to 8-10 km according to sea and fishing conditions. In fishing operation, after catchers have reached the fixed fishing ground by the directions of the mothership, they should finish up the casting of nets within the period from 3 p.m. to evening and ride temporarily at anchor near the nets. After the lapse of 8 or 10 hours (at about one o'clock next morning) they begin net-hauling and take in the catch on board. The net-casting takes about one hour and half and the hauling takes about 6 hours including the time required for removing the fish caught in nets. The catch is handed over to the mothership in the course of the day. Such operation is repeated once a day during about 3 months.

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2. Salmon Fishing operated by Single Vessels from Home Bases

(a) Driftnet Fishery

Salmon driftnet fishing by single vessels is generally operated from bases in Hokkaido. The fishing grounds in May and June being far away from the bases, it takes 3 or 5 days to reach there. After each ten day's fishing, the vessels come home. Under such conditions, one voyage takes almost 20 days. But when fish schools come near the coast to the south and fishing grounds are near the bases, ten days' voyage will be enough. The method of driftnet fishing and the type of nets are similar to those of the catcher accompanying a mothership.

In case when the fishing is operated at a short distance from home base, the catch will be carried back in raw condition, but in case of long distance it will be salted first and then be brought back. Such being the case, the labor of crew on board driftnet fishing vessels is heavy even if the operation is similar to that of a catcher.

(b) Long-line Fishing

Vessels used for long-line fishing are 40 G.T. or under. In the fishing, a long line of about 100 m in length composed of main and branch lines is a set or a basket. Branch lines with about 50 hooks hanging at intervals of 2 m are fastened to the main line at regular intervals. As baits, mainly saury are used. After the lapse of a certain time, taking into consideration the passage of fish school and the condition of hooked fish, the long line is lifted up from one end to catch hooked fish. The efficiency of long-line fishing is lower than that of driftnet fishing. The number of long-line baskets used for one operation may vary according to the conditions of fish schools and sea, but usually 200-300 baskets are used. The frequency of setting lines per day is once or twice, but in case where many baskets are used, it is limited to one time a day. But in view of the heavy works before and after the fishing operation such as the arrangement of fishing gears and bait hooking, the labor of crew in this type of fishery is also very heavy. For the purpose of hauling up the long line, power machinery is now in use.

The catch by long-line fishing is small in amount compared with that by driftnet fishing, but because of the small damage on fish body by hooks, the commodity value of fish is high and it is sold at higher price.

The period of one fishing operation extends about a month and the fishing season begins late in April and closes at the end of June. So 3 or 4 trips are made in one season.

The results of salmon fishing in 1964 were as follows:

- (1) Mothership-type Salmon Fishing—eleven fleets consisting of 11

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motherships with 369 catchers were engaged in the fishing and produced 44,000 tons of catch. Compared with the production in 1963, this shows a decrease of 2,000 tons. But such decrease was caused by the reduction in the apportionment for that year under the Convention. It means that the apportionment was fully attained (Table 19).

Table 19. Mothership-type Salmon Fishery in the North Pacific Ocean

Year	No. of fleets	No. of catchers	Fishery workers engaged	Catch amount (tons)	Value (1,000 \$)	Canned goods (1,000 c/s)
1960	12	410	12,399	53,976	5,642	1,221
1961	12	410	12,252	53,573	5,394	1,228
1962	11	369	11,439	44,601	4,692	4,692
1963	11	369	11,604	46,269	4,561	984
1964	11	369	11,808	44,449	4,436	946

Note: One case of canned salmon contains 8 dozens of ½ lb can.

(2) Driftnet Fishing operated by Single Vessels from Home Bases—333 vessels were engaged in the fishing and they produced about 10,000 tons in the waters north of 48° N., and about 13,000 tons in the waters south of 48° N., and the target for that year under the Convention was attained.

(3) Long-line Fishing operated from Home Bases—As many as vessels operated the fishing in the waters south of 48° N. and produced about 10,000 tons.

The fishing vessels operated for salmon fishing in the North Pacific Ocean for 1964 were about 1,000, and the number of fishermen engaged in the fishery reached about 25,000.

Since the salmon fishing in this area is big in scale, and the fishing vessels and crew participate in the operation from various parts of the country, it is attracting a great interest of the people and the news of the decision on fishing limit under the Japan and U.S.S.R. Fisheries Convention is reported every year with heavy head lines.

Section 3. Mothership-type Crab Fishery

The history of the Japanese mothership-type crab fishing can be traced up to 1921. The fishing grounds at that time were the western coastal waters of Kamchatka. In 1930 crab fishing began to be operated also in the Bering Sea, and it went up to the highest point around 1940

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when 13 fleets operated the fishing in the waters around Kamchatka and in the Bering Sea.

After World War II, the first fleet went up to Bristol Bay in 1953. Now 2 fleets engage in crab fishing in the eastern waters of the Bering Sea and one fleet in the western waters, and at the same time other 4 fleets carry on fishing in the western coastal waters of Kamchatka. These fleets in 1964 were organized by 7 motherships and 99 attached boats, 67 boats of which were carried boats of about 10 Ts. The total catch in that year was 15 million in number including 14 million king crabs. From these crabs, 509,000 cases of canned crab, about 15.3 million dollars in value were produced (Table 20).

Table 20. Mothership-type Crab Fishing

Fishing grounds	Year	Fleets	Attached boats (1)	No. of crabs caught (2) (1,000)	Products		Fishing period
					Canned goods (1,000 cases)	Frozen goods (tons)	
Eastern waters (Bering)	1962	5	47	4,950	130	—	4/ 8~10/24
	1963	2	26	5,476	235	—	3/26~ 9/28
	1964	2	29	5,895	235	—	3/12~ 9/12
Western waters (Kamchatka)	1962	4	56	8,482	252	—	4/20~ 8/ 8
	1963	4	56	8,360	252	—	4/15~ 7/27
	1964	4	56	8,492	252	—	4/15~ 8/15
Western waters (Bering)	1962	1	10	31	—	17	7/ 3~ 8/15
	1963	1	14	582	22	—	8/ 2~ 9/23
	1964	1	14	658	22	—	8 /3~ 9/22

Notes: (1) Carried boats are included.
(2) Includes king crab.

Since the Japanese and U.S.S.R. fishing fleets operate crab fishing in the waters around Kamchatka, they are fishing in their specified fishing grounds under the Convention.

The crab fishing in the western coastal waters of Kamchatka is, as in the case of salmon fishing in the same waters, regulated by the Japan-U.S.S.R. Fisheries Convention regarding the amounts of catch, and sizes of meshes and crabs. The fishing in the Bering Sea is also operated under the provisions of the International Convention for the High Seas Fisheries of the North Pacific Ocean (Canada, Japan and U.S.A. Fisheries Convention).

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Section 4. Tuna Fishery

Tuna is a most favorite fish food of Japanese people and is regarded as high class dish. There are various methods of its cooking. The strong demand of people is stimulating the production desire of fishermen. This important fishing is mostly operated with long lines to catch tuna and marlin. Size of fishing vessels and gears used for this purpose vary according to the fishing grounds; the vessels operated in adjacent seas are mostly of 30-40 Ts and those in pelagic seas are mostly of 200-500 Ts.

The tuna fishing vessels of over 40 Ts operated in 1964 were about 1,800 vessels, and about 50,000 fishermen were engaged in the fishing ranking one of the most important fisheries in Japan. The total catch of tuna fishing in the same year amounted to 507,000 tons, of which that of tuna was 427,000 tons, occupying about 60% of the total catch of tuna of the world in that year which amounted to 681,000 tons. The bulk of the fish catch is frozen or canned, and then exported to the U.S.A., West Germany and other countries. The export of tuna products occupied about 30% of the total amount of all exported marine products from Japan.

The production of tuna by fishing types in 1964 is as follows:

The production by self-navigating vessels operated in the Pacific and the Indian Oceans comes first and it amounted to 321,000 tons occupying 63% of the total; that by mothership type comes next amounting to 82,000 tons; the third is that by self-navigating boats of large type in the Atlantic Ocean amounting to 69,000 tons and lastly that by the fisheries operated from the bases in foreign countries amounting to 35,000 tons (Table 21).

Table 21. Tuna Fishing (1964)

Classification	No. of boats (vessels)	Fishermen (persons)	Catch amount (1,000 tons)	Catch in value (mil. dol.)
Home bases	2,550	40,337	321	126
Mothership type				
Attached boat type	128	2,300	14	3
Carried boat type	45	3,360	68	27
Atlantic fishing	149	4,200	69	21
From foreign bases	247	4,360	35	10
Total	3,119	54,557	507	187

Note: Fishing boats under 20 Ts are excluded.

The operation of tuna vessels made by sea areas in 1964 was as follows:

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(a) Tuna vessels over 40 Ts operated in the Pacific and the Indian Oceans starting from home bases were about 1,800 vessels, and small vessels under 40 Ts (including those under 20 Ts) in the coastal waters of Japan were about 1,700 vessels. With regard to the vessels under 200 Ts which mainly operated fishing in the Pacific Ocean sailing out from home bases and without touching any foreign ports, they carried their catches back to Japan and their fishery generally covered 1 or 2 months.

(b) Tuna vessels of 200-500 Ts sailing out from home bases operated in the South Pacific Ocean or Atlantic Ocean. Because of their long voyage, their catches were partly landed at ports adjacent to fishing grounds.

The operating days of pelagic tuna vessels are about a month for those of 100 ton class, about 2 months for those of 100-200 ton class and about 4 months for those of 200-500 ton class, while they are 20-30 days for offshore tuna vessels of 20-50 ton class.

Mothership type tuna fishing is divided into two types: with carried boat type and with attached catcher boat type. The fishing of the former type is operated by a mothership of 1,000 Ts in average together with 2 or 3 carried boats, while in the latter type the fishing is operated exclusively by 30-40 catcher boats of 100 ton class and a mothership is engaged in the supply of fishing materials and fuel oils and in the storage of catches. The operation period of tuna fishing of this type is 3 months per voyage, two voyages in a year being the standard. In 1964, 3 motherships and 128 catcher boats joined in this type tuna fishing.

With regard to the type with carried boat 45 motherships and 114 carried boats participated in the operation, and the number of motherships operated by seas was 3 in the Pacific Ocean, 9 in the Indian Sea and 33 in the Atlantic Ocean.

The tuna vessels which operated fishing from foreign bases were 247 vessels, of which 148 vessels had their bases in the countries in the Pacific Ocean, 95 in the countries in the Indian Ocean and 4 in the Atlantic Ocean. Such fishing operation from foreign bases has developed through the mutual understanding and cooperation with the foreign countries concerned. The number of the vessels operating fisheries from foreign bases gradually increased from 86 in 1960 to 135 in 1962 and to 247 in 1964; - 77 at Samoa, 16 at Santos, 37 at Numea and 18 at Fiji in the Pacific Ocean, 24 at Penang in the Indian Ocean, and 4 at St. Martin in the Atlantic Ocean.

In the application for the license of tuna fishery to be granted by the Fisheries Agency, applicants should take the proceedings prescribed by law relating to commencement of operation, number of vessels to be used, tonnage of boats, fishing areas, etc.

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With regard to the progress of tuna fishery in the past, its production before 1951 was under 100,000 tons, but it began to exceed this mark in 1952 and went up very rapidly ever since reaching 320,000 tons in 1956, 380,000 tons in 1959, then to 484,000 tons in 1961, showing two times increase in 5 years. The future prospects of this fishery, however, do not always warrant optimism in view of the increased equipment investment, the shortage of labor power and increased voyage expenses caused by the extended fishing grounds. What is more, the catch per fishing effort decreased. As to the catch amount, again, it is more or less declining in these years with the highest record of 536,000 tons in 1962 and now the catch was 500,000 tons in 1965.

Section 5. Trawl Fishery

Trawl fishery varies according to its size and fishing areas. It may be divided into five main types.

1. Mothership-type trawl fishery.
2. Trawl fishery in offshore of Africa and Australia.
3. East China Sea trawl fishery.
4. Medium trawl fishery in Japanese offshore waters.
5. Small-type trawl fishery.

This fishery has developed with the increased demand of fish in the country. But now for the purpose of conservation of fishery resources and prevention of excessive exploitation, strict regulations are being placed on the operation. Especially, owing to the very strict regulations on the size of vessels; fishing methods and areas in coastal and offshore fishing waters, a declining tendency has occurred in the number of fishing vessels.

The production by trawl fishery in 1964 amounted to 1870,000 tons occupying about 30% of the total sum of fish catches in that year and 299 million dollars in value, each showing 10% increase compared with the previous year. Such increased production was brought forth by the favorable operation of mothership-type trawling in the Bering Sea, and by the increased catch by trawling in waters around Africa and the North Pacific Ocean. But the production by trawling in the East China Sea and the Yellow Sea decreased by 13%.

The fish caught by trawl fishery includes various species and they are used for various purposes in such forms as fresh fish, processed foods and fish meal. With regard to their price, sea-bream, flatfish and shrimps represent the highest price, large croaker, conger eel and hair-tail come next, followed by alaska pollack, flatfish and rock fish, which are mainly

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caught in the northern waters of the Pacific Ocean and most of which are processed into foods and partly into meal and oil.

1. Mothership-type Trawl Fishery

The number of fishing fleets which operated mothership-type trawl fishery in 1964 amounted to 17. Fishing areas of these fleets were in the northern waters of the Pacific Ocean; in the Bering Sea 14 fleets were operated, and 3 of them were fish meal factoryships, and the rest were freezing factoryships. In the Okhotsk Sea 3 fleets operated fishing and all of them were freezing factoryships (Table 22).

Table 22. Pelagic Trawl Fishery

(Unit: 1,000 tons)

Year	Mothership-type trawl fishery			Northern pacific trawl fishery		Offshore trawling in Africa and Australia		Trawl fishery in the East China Sea		Total amount of catch
	No. of Fleets	No. of attached boats	Catch amount	No. of vessels	Catch	No. of vessels	Catch	No. of vessels	Catch	
1960	16	210	472	—	—	15	13	432	368	853
1961	36	408	639	3	4	22	34	431	374	1,051
1962	28	344	524	2	6	40	53	425	331	914
1963	23	297	338	5	18	39	97	410	345	798
1964	17	265	438	9	29	61	130	419	302	899

In 1961, 33 fishing fleets operated fisheries in the Bering Sea. But because of their over-production and the pressure of the Peruvian fish meal upon the world market which brought forth a fall in the price of products, the number of fleets dropped to 14 in 1964. In the Okhotsk Sea, however, 3 fleets kept on fishing for 5 years and their production is comparatively stabilized.

In spite of the number of fleets decreased by 6, the production in the Bering Sea in 1964 amounted to 415,000 tons, showing an increase of about 100,000 tons over the production in 1963. Such favorable aspect was caused by the good catch of cods, flatfish and alaska pollack and by the fine weather during the season. On the other hand, the production in the Okhotsk Sea was about 22,000 tons, 2,000 tons smaller than that in the previous year.

The mothership-type fishery is operated by a fleet composed of a factoryship (freezing or fishmeal) of about 7,000 Ts and 15 or 16 attached fishing boats for a long period of time extending about 6 months. As to the scale of fishing fleet in the Okhotsk Sea, however, it is smaller than the other, and the attached boats are under 100 Ts. Its fishing

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period is also limited to 2 months from September to October.

2. Trawl Fishery in Offshores of Africa and Australia

The factory-type stern-trawling in these sea areas was commenced in 1959. The main fishing grounds are in the waters off the coast of Africa and New Zealand, and large-type boats of 1,000-3,500 Ts are being operated. The number of boats operated in 1964 was 61, greatly surpassing 39 in the previous year, and those operated in the western waters off Africa were 34 vessels and those in the southern waters were 10 vessels. In the waters off New Zealand and the northwestern waters off Australia, 3 vessels and one vessel were operated respectively.

The production by these vessels in 1964 amounted to 130,000 tons, showing about 34% increase over that in the previous year, and was 36 million dollars in value. Most of the catches by the large-factory-type trawler belong to high-class fish such as sea-bream and cuttlefish which are highly esteemed by Japanese people. The rate of their production in the total amount by the trawl fisheries was 8%, but that of their value occupied 12% of the total.

The catches by this fishery are partly exported from the fishing grounds directly to the neighbouring countries and partly are carried back to Japan. The portion of those directly exported has become large in recent years. With regard to the proportion of the catches in the offshores of Africa to the amount of direct exportation in 1964, 43% of them was exported to Ghana, Liberia, Italy, Greece, Rumania and Spain.

The sea areas of offshore trawling being international waters where fishing vessels of many countries are operating, it is absolutely necessary to maintain friendly relations with the coastal countries where the catches are landed. Accordingly, the government places strong restrictions on the license for this fishing operation.

3. East China Sea Trawl Fishery

The trawl fishing in the East China Sea and the Yellow Sea is operated by two boats in a pair and the size of these boats is larger than that of boats used in the coastal waters and the average tonnage per vessel is 80-100 Ts. With the recent shortage of labor power and for the purpose of mechanization of operation, larger vessels of 150-200 ton class have come to be used. The craft now in operation in these waters are about 760 vessels, but because a definite limit is placed by fishery regulations on the total tonnage of these vessels and the increased tonnage by use of larger vessels exceeds such limit, the number of the present vessels will be reduced to that extent.

The fishery production in 1964 was 289,000 tons, showing about 13% decrease compared with that in the previous year. With regard to the kinds of fish caught, prawn and sea-bream were small in quantity while

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croaker, conger eel and hairtail occupied about 50% of the total, and they are manufactured into processed food in cities of Shimonoseki and Nagasaki which are the main bases of this fishery.

4. Medium Trawl Fishery in Japanese Offshore Waters

This fishery is one of the most important offshore fisheries in Japan and its production occupies about 10% of the total production by marine fisheries, ranking next to that by purse-seine fishery. The production in 1964 amounted to 746,000 tons, showing 13% increase over the previous year. The fishing grounds extend all over the offshore waters around the coast of this country, especially the northeastern offing of the Pacific coast and the western sea areas are most important. Both single and pair trawlers are operated for this purpose, and 90% of the total number is occupied by single trawlers and 10% by pair trawlers.

In this fishery 1,166 trawlers are engaged, of which 290 are registered in Hokkaido which is nearest to the northeastern fishing grounds in the Pacific Ocean, and their production in 1964 was 550,000 tons, occupying about 70% of the total. The fishing vessels of Hokkaido are of 50-100 ton class and they are larger than those in any other area. Since the development of the north-eastern Pacific fishing grounds in 1963, a gradual increase is seen in the number of vessels operated in this sea area (Table 23).

Table 23. Production by Small and Medium Trawl Fisheries in Offshore Waters of Japan

(Unit: 1,000 tons)

Year	Total		Small type (less than 15tons)		Medium type (15~100tons)	
	No. of vessels	Catch amount	No. of vessels	Catch amount	No. of vessels	Catch amount
1960	36,078	845	34,710	213	1,368	632
1961	35,252	863	33,957	215	1,295	648
1962	33,744	838	32,462	208	1,282	630
1963	32,740	912	31,514	209	1,226	703
1964	31,877	976	30,711	230	1,166	746

With regard to the kinds of fish, they are various owing to the wide range of fishing grounds. In the northern fishing grounds in the Pacific, the production of pollack occupies more than 60% of the total and that of flatfish is small, while in the waters around Japan, high percentage is occupied by flatfish, crab and other high-class fishes, but that of pollack is 30%. The fishing days per vessel in a year are 180 days on an average, and the number of fishing voyages is 80 in a year, one voyage generally covering 2~5 days. Dragging of nets is repeated 6~7 times in a day,

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and about 8 tons of fish are caught. But in case of the fishing operation in the northern waters of the Pacific, one voyage is lengthened to about half a month.

5. Small-Type Trawl Fishery

Small-type trawl fishery is a coastal fishery operated with boats less than 15 Ts, and it occupies an important position in coastal fisheries accounting for 12% of all the production in coastal waters. The production in 1964 amounted to 230,000 tons, showing 10% increase over that in the previous year. The fishing boats operated in 1964 were about 31,000 boats, showing about 2% decrease compared with those in previous year. The majority of these boats consisted of those under 3 Ts., occupying about 50% of the total. Since these boats operate fisheries in coastal waters where other types of fishery are also operated, strict regulations are in force for the purpose of adjustment in between.

The catches by this fishing include shrimp, prawn, flatfish, flounder, crab, octopus and shellfishes. These fishes are caught mixed in one haul. Because of the high freshness of catches owing to the short distance between fishing grounds and landing places, they are transacted in good condition.

This type of fisheries is mostly operated by family labor, and one or two persons will be enough for one operation. About 71,000 persons are estimated to be engaged in the fishery.

Section 6. Purse Seine Fishery

This is the most productive fishery in the country and its objects are migratory fishes such as sardine, mackerel, horse mackerel as well as yellowtail and tuna.

The history of this fishery in Japan is old and it can be traced back around 1880 when no motor was used for fishing boats in this country. In those days, this fishery was operated for the purpose of taking sardine in the coastal waters. With the improvement of fishing nets and the introduction of powered fishing boats afterward, a speedy development was attained in its operation, and in 1936 its production became to occupy 40% of the total production of all fisheries. With the decline in sardine resources afterward, the production came to a standstill for a while, but with the development of the resources of horse mackerel and mackerel, it was recovered. In 1964, it went up to one million tons (Table 24).

With regard to the operation of single and pair purse seine fisheries, a gradual increase is seen in the operation of the former and a gradual decline in the latter. The single purse seiner is largely operated in the East China Sea and in the offing of Kyushu, and also in the western areas

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of the Japan Sea and in the offing of Hokkaido. The production in the East China Sea in 1964 occupying the first place among the rest amounted to 235,000 tons. The main fishing ground of the pair purse seiners is the western waters of Japan and the production in 1964 was about 400,000 tons. Compared with the single, the pair netters are generally small in size and mobility, and naturally their capacity or production is small and their annual production is about 1,200 tons being about 50% of that of single purse seiners.

Since the purse seine is a large fishing gear, it requires proportionate number of hands to handle it. But the recent shortage of labor power is preventing the employment of hands, especially of young hands. In order to cope with such situations, the development of labor-saving machinery is now being promoted. Of late, fishing vessels equipped with side rollers for net hauling (equipped on shipside with 4 or 5 shafts of special rubber of 15-20 cm in diameter and 2-3 m in length) have come to be used. Power blocks of American type have been introduced by some quarters, but perhaps by the difference in sea conditions and fishing method between the two countries, this type of machinery is not used widely.

Section 7. Saury Stick-held Dipnet Fishery

In prewar days saury were caught mainly with drift gillnets. But with the development of stick-held dipnet fishery with fish luring lamps in 1943, saury attracted to the light have come to be caught by this economical and efficient fishing method.

Saury are migratory fish being distributed far and wide in the North Pacific Ocean. Despite of some fluctuations owing to sea conditions, they usually appear in the northern waters of the Pacific Ocean early in August and migrate down toward south along the coasts of the Northern Kurile Islands and Hokkaido, then passing the Pacific waters in Septem-

Table 24. Production of Purse Seine Fishery

Year	Total		Single purse seine					Pair purse seine				
	No. of vessels operated	Catch amount (1,000ts.)	No. of vessels operated	Catch amount (1,000ts.)	Sardine	Horse mackerel	mackerel	No. of vessels operated	Catch amount (1,000ts.)	Sardine	Horse mackerel	Mackerel
1960	1,405	913	471	512	56	360	78	934	401	240	100	29
1961	1,323	957	476	499	37	343	97	847	458	311	84	25
1962	1,346	970	527	545	33	345	134	819	425	262	78	44
1963	1,256	905	524	480	33	274	151	732	425	217	66	108
1964	1,237	1,012	537	616	39	365	174	700	396	183	57	106

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ber and October they arrive in the offshore of Tokyo late in October and November. After that, they continue their southward migration along the Pacific coasts of the Japanese Islands and then they break up their migration in February or March.

The production by this fishery varies according to the sea conditions, and a good record is made when saury make their migration near the shore while a poor catch is recorded when they come down southward in the offing widely scattering. The production in 1964 is the lowest record in the past (Table 25).

Table 25. Production of Saury Stick-held Dipnet Fishery

Year	No. of vessels operated	Vessels by scale				Catch amount (1,000ts.)
		~20ts.	20~50ts.	50~100ts.	100ts.~	
1960	2,334	980	718	552	84	276
1961	2,424	1,133	747	480	64	461
1962	1,780	768	587	393	32	476
1963	1,813	852	526	405	30	377
1964	1,628	746	467	386	29	202

The vessels go out for fishing in the fishing season from almost all fishing ports on the coast of the Pacific Ocean and their fish landing places are not fixed because of the fluctuations in the migration of fish. All these vessels are also used for other fisheries before and after the fishing season of saury. Accordingly, the size of the vessels and their fishing gear are varied; but the percentage of vessels of 30-50 ton class and those of 50-70 ton class is the highest, occupying about 80% of the total.

The craft actually operated in 1964 were about 1,600 vessels, showing about 11% decrease compared with the previous year. The rapid decline in the number of fishing vessels engaged in the fishery from 1961 was caused by the remarkable decrease in that of small boats under 10 Ts which are not fit for distant operation in case of offshore migration of saury.

The open season for this fishing is from September to December, and the day for sailing out for fishing is fixed every year by the government based on the result of its survey on fishing conditions in the following ways: the last 11 days of August for fishing vessels of 20-30 Ts, and the first 10 days of September for those over 30 Ts. The candle power of fish lamps is restricted under 30 kw for the purposes of conserving the resources and of coordinating the fishery.

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Section 8. Fixed-net Fishery

According to the scale of fishing net used for the fishery, fixed-net fishery is divided into large and small types. Large fixed-net fishery is defined by the Fisheries Law to be "fishery operated over 27 meters deep at the highest tide at the deepest point of the place where the main net is fixed." The largest type of this fishery requires about 60 hands for operation.

The total number of the fixed-nets operated in 1964 amounted to about 15,200, of which 1,300 nets were used for large-type fishery and 13,900 nets for small-type fishery. The production by this fishery in 1964 was about 220,000 tons, of which about 28,000 tons went to horse mackerel, 24,000 tons to mackerel, 20,000 tons to sardine, 19,000 tons to yellowtail, and 14,000 tons to salmon. Since the production of yellowtail by all kinds of fishery amounted to 43,000 tons in the same year, the production by fixed-net fishery occupied about 45% of the total (Table 26).

Table 26. Production by Fixed-net Fishery

(Unit: 1,000 tons)

Year	Total		Large type		Small type	
	No. of nets used	Pro-duction	No. of nets used	Pro-duction	No. of nets used	Pro-duction
1960	17,316	215	1,756	137	15,560	78
1961	17,821	234	1,656	151	16,165	83
1962	16,274	211	1,403	129	14,871	82
1963	15,328	216	1,410	131	13,918	85
1964	15,234	220	1,288	131	13,946	89

Because the catches by fixed-net fishery are mostly shipped to markets of producing centers in fresh and most of them belong to high-class fish, with the recent rise in general fish prices, the catch in value of these fishery products in 1964 went up to 57 million dollars.

In the fishing operation, net-hauling is generally made once or twice a day. In case of large type fixed-net fishery, 40 or 50 hands are needed for net hauling while 1 or 5 hands are needed for small type. Because of short time operation, persons of advanced age are seasonally engaged in this fishing. But in view that as many as 100,000 persons are engaged in a year, it can be said that this fishing is an important coastal operation in the country.

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Section 9. Angling Fishery

Skip-jack pole fishing, mackerel angling and squid angling are representative anglings in Japan.

1. Skip-jack Pole Fishery

The offing of the Pacific coast is the main fishing ground of this fishery. But since good skip-jack fishing grounds are formed in the southern waters of the Pacific coast by the approach of warm currents to the main land, this fishery is operated by boats under 20 Ts even in the coastal waters. The fishery by large vessels of 100 ton class is mostly operated in the northern waters off the Pacific coast and in the southernwaters.

In the Japanese waters, the fish schools appear in the southern waters in March and April and gradually go up north, and then they disappear. So July and August are thought to be the best fishing season in the year.

The fishing vessels operated for skip-jack pole fishery in 1964 were about 4,400 vessels and their production was 184,000 tons. Of these craft, 3,800 vessels were those under 20 Ts., and as to the vessels over 20 Ts., though their percentage in number was only 12%, their production went up to 163,000 tons.

The fishing days per year of vessels under 50 Ts are 40 to 50 days and their navigation at a time extends about 10 days; and the average catch per vessel is 15 to 20 tons, while those of vessels over 50 Ts are 180 to 200 days and their navigation days are about 12 days, the average catch per vessel being about 500 tons. Most of these vessels are also operated for other fisheries.

The fishing season of small vessels under 50 Ts is almost limited in the time when fish shoals are migrating in the local offshore waters, but those over 50 Ts operate the fishery in pursuit of shoals far and wide from the southern waters to the northern waters of Japan.

Since this fishing is operated with poles, many hands are needed in the face of the present shortage in man power, and the fishing on the spot is restricted by the limited supply of baits which are composed of live small sardine. More than half of the catch is processed into "katsuo-bushi", dried skipjack, which is a time-honored seasoning in Japan. But owing to the recent mass production of chemical seasonings, the market of dried skipjack is now at a standstill. Under these situations, a declining trend is seen in the number of fishing vessels of this kind (Table 27).

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Table 27. Production by Anglings (Unit: 1,000 tons)

Year	Total	Skipjack pole fishery angling	Squid angling	Mackerel angling	Other anglings
1960	843	110	470	197	66
1961	774	167	378	156	73
1962	974	188	533	178	75
1963	967	158	580	149	80
1964	645	184	237	144	80

2. Mackerel Angling

From olden times mackerel angling was operated in a small scale in the coastal waters, but with the recent wide use of synthetic fibre and the improvement of fishing methods, the catching efficiency of this fishery has been promoted to a great extent and the angling by large vessels has come to be operated.

In 1964, 144,000 tons of fish were produced by 1,200 fishing vessels of this type. If those very small boats operating in coastal waters be added to the number, it will reach as many as 5,200 vessels.

The new method of mackerel angling is called "hane-tsuri" fishing, which is operated with jigs using fish lamps and ground baits. In 1964 this fishing method was used exclusively in the central waters of the Pacific coast, where the production of 131,000 tons was made by about 1,100 fishing vessels. In the same waters, purse seiners also operated mackerel fishing in competition with each other.

The season of "hanetsuri" fishing generally covers six months, from January to June, the best season being from April to May. The catch in the best season occupies 40% of the total catch.

With regard to the accomplishment of fishing vessels of this type in 1964, the catch by 900 vessels under 20 Ts (75% of the total number) was 55,000 tons (38% of the total catch) while the catch by 300 vessels over 20 Ts was 89,000 tons (62% of the total catch).

The average number of the crew on board these vessels is 10, and they make about 35 fishing voyages in a year, catching about 280 tons on an average. The average catch by one voyage is 3 tons, but because the catches contain a large number of big mackerels, they are marketed in profitable conditions.

3. Squid Angling

Squid angling is one of the most important coastal fisheries, and a great number of fishing boats are operating this fishery. It occupies the first place in the number of boats and in the catch amount of fisheries fishing single species.

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The number of squid angling boats operated in 1964 amounted to 35,700 vessels, of which 33,700 vessels belonged to small type boats under 10 Ts. In 1963 these boats caught 580,000 tons of squid which is the highest record in recent years, but their production in 1964 was dropped to 237,000 tons. The squid is an annual marine animal, and its production is subject to annual fluctuations. The fishing season extends over 9 months from June to February, and September to November are the best season. The squids caught in the winter season are largely dried for sale and those caught in the summer and autumn seasons are marketed in fresh form. With the recent development of mass production of smoked-dried squid, improvement has been made in the taste and demand of this fish.

The number of fishermen engaged in this fishery in 1964 amounted to 93,000 persons. In case of this fishery, again, in order to cope with the shortage of labor power, labor saving gears and methods have been developed and the angling operations have been mechanized.

Chapter V

Fish, Shellfish and Sea-weed Culture in Shallow Sea

Section 1. General Situation

Culture in shallow seas has made a remarkable development in recent years. Its products in value have increased from 93.6 million dollars in 1960 to 234 million dollars in 1965, showing an increase from 25% to 33% of the total value of coastal fisheries (Table 28).

Table 28. Production in Value of Culture in Shallow-seas

(Unit: \$1,000)

Year	Total values	Coastal fisheries	Culture in shallow seas			
			Total	Laver	Pearl	Others
1960	1,022,778	368,889	93,612	54,167	27,778	11,667
1961	1,170,000	423,611	126,389	60,556	53,611	12,222
1962	1,259,444	463,333	149,167	78,056	54,167	16,944
1963	1,427,222	539,722	180,278	92,222	68,333	19,722
1964	1,471,389	561,389	201,111	107,222	69,444	24,444
1965	1,544,872	676,302	233,586	101,822	85,089	46,675

Such rapid development of culture in shallow seas in a few years has been promoted by various factors. The most important factors of them all are the following three:

(1) The government policy for coastal fisheries aimed at the switch over from the primitive exploiting fishery to the modern culture fishery. Under this policy, a series of measures, such as the Improvement Measures for the Structure of Coastal Fisheries, have been concentrated upon developing the culture in shallow seas;

(2) A speedy progress has been made in the culture techniques, especially in artificial germination and vertical use of fishing grounds;

(3) With the recent development of national economy and improvement of diet life of the people, the demand for high-class fish and shellfish has increased in the face of the declining tendency in their production, which can be made up by the production of the culture industry.

It must be noted here that the water pollution by the sewage of seaside factories and cities lowers the productivity and greatly obstructs the development of the culture in shallow seas.

Section 2. Seaweed Culture

1. Laver ("Nori") Culture

Laver is one of the most necessary and special items in Japanese food from old times. Laver is largely eaten in dried form, and its supply depends entirely upon cultured weeds. The history of laver culture can be traced back to the days prior to the sixteen-seventies when artificial farming of laver was tried in Tokyo Bay, using bamboo sticks to settle spores. From around 1915, the method of laver culture was improved, from the vertical sticking method with bamboos to the horizontal method with nets, which was gradually popularized and also increased the production.

The laver production in 1941, the highest record in prewar days, is estimated as 12-15 hundred million sheets (1 sheet is a dried laver of 20 cm sq. in the shape of paper). But with the recent improvement of laver culture techniques, especially with the speedy spread of artificial germination technique, the production of seeds has been stabilized. Further, new culture farms have been developed by means of breakwater fences or by floating culture method. By these improvements together with the increased demand of laver, its annual production has gone up to 40-50 hundred million sheets.

In the meantime, owing to the secured supply of necessary seeds, and the high market price of laver, culturists began to set nets to almost the limits of capacity in the culturing grounds, which brought about changes in the sea conditions, increased the damage of laver, and exerted harmful influence upon its production. As a result of such events, the crops in 1963 and 1965 turned out to be failures. As a countermeasure, in 1965 a new method with spore attaching nets, which was in frozen form, began to be used. The extensive use of this method made it possible to confine the decrease of production in bad harvest years to the minimum, by substituting the preserved nets for damaged ones. In the normal year, such substitution makes it possible to extend the present culture season (November to February) until April. In this way, the new method, when widely adopted, will bring about a great change in the method of production and its quantity. On the other hand, experiments are being conducted regarding fertilization for the purpose of improving the quality of laver, but it is not ascertained yet, whether its adoption will justify the costs.

With regard to the future prospects of this industry, in view of various harmful influences from the reclamation of coastal fishing grounds, the development of seaside industries and the water pollution by drainages from factories and cities which may grow more serious in

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the future, it is doubtful whether the production by this industry will increase so speedily as before.

2. "Wakame" (*Undaria pinnatifida*) Culture

The culturing of "Wakame" has been developed very speedily in the past five years all over the country. It is estimated that its production has reached around 50,000 tons now. This culturing was industrialized in the northern coastal waters of the Pacific side of Japan in 1955, and has gradually been propagated all over the land.

This farming is expected to be widely operated in the future, because deeper waters than those for laver or oyster culturing can be used, and cultured "Wakame" are more profitable than natural "Wakame", because of rapid harvesting.

The most popular culturing method is as follows: Spore attaching threads are fastened to leading ropes, or short-cut spore attaching threads are put into the layers of leading ropes, and then the ropes are stretched out. There are three ways of stretching ropes; horizontal stretching with rafts, long-line and vertical stretchings. In any of these ways, it is absolutely necessary that the structure should have strong wave-resistant power.

Section 3. Shellfish Cultures

1. Pearl Culture

Pearl culture in Japan was initiated by the introduction of the culture method of semi-spherical pearls in 1893. But its regular culture was started by the use of globular pearl culture method in 1907. Japan is the only country in the world producing cultured pearls, and 90% of the products are exported to all the countries in the world. The exports in 1964 amounted to 75.7 tons in quantity and 55 million dollars in value, and their buying countries reached more than one hundred.

More than 90% of the total production of pearls by Japanese people belong to marine products whose mother shells are known as "Akoya gai" (*Pinctada martensii*), and the rest belong to the marine pearls whose mother shells are called "Kurocho-gai" (*Pinctada margaritifera*). Fresh water pearls whose mother shells belong to "Ikecho-gai" (*Hyriopsis schlegelii*), as well as to the pearls which are cultured by Japanese people in Australia and other countries from mother-shells belonging to "Shirocho-gai" (*Pinctada maxima*) and "Mabe-gai" (*Margaritifera margaritifera*).

The postwar production of pearls is making a steady progress, and it reached 88 tons in 1964, far surpassing the 11 ton-output in 1939, the highest record in prewar days (Table 29). Such a great progress in

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Table 29. Production of Pearls in Major Prefectures

(Unit: Kg.)

Prefectures	1960	1962	1964
Mie	39,826	44,582	42,624
Nagasaki	4,737	8,151	12,254
Ehime	2,358	3,439	5,324
Hiroshima	2,678	3,503	3,863
Kagawa	1,000	3,282	3,821
Kumamoto	735	2,502	3,641
Oita	179	427	2,547
Tokushima	605	1,522	2,504
Kochi	1,012	2,045	2,221
Okayama	1,356	2,056	2,025
Shizuoka	1,506	1,606	1,411
Others	4,416	5,936	6,348
Total	60,408	79,051	88,587

production may be attributable to various factors, but the most important factors are the general economic prosperity of the world, (especially in U.S.A.) the increased liking for cultured pearls, the intensified demand into people's tastes, and the speedy improvement of culture techniques, such as artificial seed propagation, management of culture grounds and processing techniques. As a result of these technical improvements pearl culture grounds were greatly extended.

The producing centers formerly concentrated to some special areas have come to be scattered far and wide lately. In 1953, the production in Mie Prefecture occupied 89% of the total in the country, but in 1964 it declined to 48%. The reason is attributable to the overexploitation of the culture grounds in the prefecture by intensive culturing which reduced the quality and yield-rate of pearls. As a result, leading culturists removed from Mie Prefecture to Seto Inland Sea, Shikoku and Kyushu districts, and instead, the number of indigenous culturists has increased. In this way, the number of pearl culture management units increased year after year. The 359 managements units in 1950 went up to 4,303 managements units in 1964, showing a 12 fold increase.

The process of pearl culture begins with the insertion of cores into mother-shells. With regard to the supply of mother-shells, the use of natural shells was gradually changed to cultured ones from 1952 and now 100% of them are supplied with cultured ones. According to the survey made by the Fisheries Agency, the production of cultured mother-shells in 1964 amounted to about 580 million shells, 18,289 tons in weight. Almost all of pearl culturists cultivate these shells, but there are also special mother-shell culturists who sell their products to pearl culturists, and most of them are considered fishery management-units of a small scale.

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A rapidly increasing tendency is seen in the number of those mother-shell culture management units, and 2,986 managements in 1959 reached 7,974 in 1964; and among them the number of self-supporting pearl culture managements was 809.

As for exported pearls, about 70% of them are exported in the form of necklaces while 30% are in other forms. With the increased demand for large pearls several years ago, the production of pearls of large type was encouraged for a while, but owing to the change of fashion afterwards, the production rate of large pearls began to decline in 1962, from the peak of 24% to below 20% in 1964 against the increase of medium and small pearls (Table 30).

Table 30. Production of Pearls by Sizes

Years	Production	(Unit: kg.)					
		Large size (over 7.6mm diam)		Medium size (over 6mm under 7.6mm)		Small size (under 6mm diam)	
		Quantity	%	Quantity	%	Quantity	%
1959	51,308	6,704	13	20,688	40	23,916	47
1960	60,007	13,082	22	26,376	44	20,549	34
1961	72,976	17,768	24	31,468	43	23,740	33
1962	79,051	18,652	24	33,507	42	26,891	34
1963	88,379	17,686	20	33,932	38	36,760	42
1964	88,587	17,334	20	38,355	43	32,897	37
1965	111,460	19,057	17	46,816	42	45,586	41

With regard to the yield rate of pearls of good quality, as a result of the recent marked increase of vermin and the repeated use of the same culture grounds, a declining tendency is seen in the yield rate incurring high costs, despite the improvement of culture techniques.

2. Oyster Culture

Most of the species of oyster cultured in Japan belong to "Magaki" (common oyster), and only in small quantities, "Suminoe-gaki" are cultured in Ariake Bay and "Olympia oyster" in Sendai. "Magaki" are cultured in various districts from Hokkaido in the north to Kyushu in the south, and their species can be divided into two groups: north and south. Those being cultured in Miyagi and Iwate prefectures belong to the north group and those in Hiroshima, Saga and other prefectures to the south group.

The most important culture method is the hanging method with rafts or long-lines, and in the waters where the hanging method is not used, the sowing method or stick-culture method is used.

The number of oyster culture managements amounts to about 8,000,

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showing no change in number for these several years (Table 31). The management may be divided into two types: culture of oysters for food and culture of seed oysters. The number of the first type is showing a rising tendency while that of the second type mostly operated for the purpose of exporting to U.S.A. is declining.

With regard to the production of oyster for food in these five years, that from Hiroshima Prefecture occupies about 70% of the total.

Table 31. Number of Oyster Culture Managements

Purpose of culture	1960	1961	1962	1963	1964	1965
Total	8,096	8,294	8,075	8,482	8,063	7,669
Seed oyster (A)	260	277	292	300	328	351
Oyste for food (B)	6,190	6,229	6,194	6,788	6,494	6,128
(A) + (B) combined	1,646	1,686	1,589	1,309	1,241	1,180

Table 32. Production of Oyster (in shucked form)

Prefectures	(Unit: tons)					
	1960	1961	1962	1963	1964	1965
Total	25,977	23,352	30,075	35,990	33,506	34,463
Hiroshima	16,753	12,444	17,370	22,217	20,429	23,295
Miyagi	3,717	4,248	4,778	4,792	5,109	3,457
Iwate	1,020	1,473	1,747	1,996	1,724	1,311
Others	4,487	5,187	6,180	6,985	6,244	6,400

3. Culture of Other Shellfishes

Next to pearl and oyster, abalone, top-shell (Turbo), clam, short-necked clam, scallop, and arkshell are important shellfishes. The production of these items including natural products in 1963 was about 332,000 tons. The culture methods of these shellfishes are mostly primitive, and no positive development measures have been taken other than the improvement of fishing grounds by sinking stones or cultivating the bottom of the sea, and by transplantation of seeds. Accordingly, no remarkable increase has been made in their production.

However, as a result of the strenuous study on development of the techniques of seed production by artificial hatching made in these several years, the experimental hatching of abalone, arkshell and scallop has been completed, and is going to be industrialized. In regard to clam and topshell, also, their hatching method will be established before long. In this way, using these seeds, the hanging culture of these shellfishes will be gradually popularized and their production will increase year by year.

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Section 4. Culture of Fish and Others

Fish culture has achieved a remarkable development in these years. With regard to the number of fishery management units and production, 117 and 1,615 tons respectively in 1960, jumped up to 998 and 10,500 tons respectively in 1964, showing an increase of 8.6 times in the number of management units and 6.5 times in the production (Table 33).

Table 33. Production of Fish and Crustacea

	(Unit: ton)					
	1960	1961	1962	1963	1964	1965
Grand total	1,615	2,824	5,386	5,949	10,498	19,217
Fish						
Total	1,524	2,705	5,200	5,756	10,342	18,894
'Hamachi' (Young yellowtail)	—	2,579	4,758	5,083	9,493	18,083
Globefish	—	97	151	113	86	91
Octopus	—	17	252	476	647	619
Others	—	12	39	84	116	101
Crustacea						
Total	91	119	186	193	156	323
Prawn	74	101	163	184	145	305
Lobster	17	18	19	7	10	16
Blue crab	—	0	4	2	1	2

The most important among them is "Hamachi" (young yellowtail). Its culture managements occupy 93% of the total and its production, 90%. Such outstanding development of this culture has been brought forth by the positive encouragement by the government through the policy of improving the structure of coastal fisheries and others, and by the improvement of seed harvesting methods and breeding management, which has induced small management units to join this culture. The increased production of "Hamachi" is also sustained by its extended market. Since "Hamachi" can be bred for more than one year in the coastal waters in the Pacific where the water temperature is warm enough in winter, the adjustment of their demand and supply can be made according to their market price.

Regarding the culturing areas of these fishes, the culturing in the Seto Inland Sea which occupied the foremost position in production for a long time began to decline in 1963, with the rise of the culture industry in the Pacific coast, such as in the coastal waters of Mie and Kochi Prefectures, and the percentage of the production in the Seto Inland Sea has decreased to 40% of the total.

The culture industry of seabream, octopus, prawn and others is also

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making fair progress, except globefish culture, which is hampered by the shortage of seeds.

With regard to the supply of seeds, the culture industry, except part of prawn culture, depends entirely upon natural production, and their shortage makes it difficult to carry on planned fish production, and is thus disturbing the stabilized management and favorable development of the industry.

As regards the future prospects of this industry, however, in view of the recent development of seed producing techniques by artificial hatching, the industrization of prawn culture by artificial seeding, the establishment of an overall culture method of blue crabs (eggs—seeds—adults—eggs), and the development of seed production techniques of globe fish, red seabream, rock fish, grey rock cod and cuttlefish by units from tens of thousands to hundreds of thousands each which is expected to be put in practical operation within one or two years, it is certain that a regular supply of seeds of these fishes will be secured without fail. It is also believed that the development of sea culture techniques of rainbow trout, salmon and "ayu" using fresh water seeds will facilitate the growth of the many-sided culture industry with various kinds. Further, earnest studies are being made on the development of feeds indispensable to fish culture and engineering works necessary for the improvement and construction of culture grounds as well as on the breeding and disease of fish.

In the Seto Inland Sea, taking its whole area for a large culture pond, a large scale culture industry began to be undertaken in 1963 through artificial propagation and stocking with important fishes and crustacea, as a joint project of the State and the prefectures concerned. This experimental undertaking, when proved successful, will be extended all over the coasts of the country.

Chapter VI

Inland Water Fisheries

Section 1. Outline of Inland Water Fisheries

About 18,100 km² or 4.9% of the whole land of Japan is occupied by rivers, lakes and reservoirs. From the geographical point, the land stretches long and slender from north to south (46°N to 26°N), and its central part is mostly occupied by mountain ranges and has few plains. The sizes of rivers and lakes are naturally small. Even the Tone River, the largest one in basin, is 15,760 km² and the Shinano River, the longest one, is 370 km. The area of Lake Biwa, the largest lake in this country is not larger than 700 km². Generally speaking, rapids running in the rivers and nutritive lakes are very few in our mountainous country. With regard to the production by the inland water fisheries excluding estuarine fisheries, it is far behind that of the sea fisheries.

Most of fishery products from the inland waters are used as high-class food items, and the fishes in rivers and lakes are widely exploited as objects of the sport-fishing of people. Under such conditions, inspite of the deterioration of natural environments with the recent development of industries, such as the blockade of fishways of anadromous species by the construction of dams for the purpose of irrigation and generation of electric power and the water pollution by agricultural chemicals and drainage from factories and cities, the fishery production in the inland waters is sustained by the remarkable improvement of fish culture techniques in recent years.

The production by inland water fisheries in 1965 registered 146,000 tons, of which 113,000 tons is by the river and lake fisheries, and at the same time the production by fish culture went up very fast amounting to 33,000 tons, about 1.74 times increase of that in 1961. The latter already exceeded the former in the catch value. (Table 34).

Table 34. Changes in Production by Inland Water Fisheries

(Unit: 1,000 tons)

	1957	1961	1962	1963	1964	1965	'61/'57	'65/'61
Inland water fisheries	95	101	104	108	119	146	1.06	1.45
River and lake fisheries	81	83	84	85	89	113	1.02	1.36
Culture fisheries	14	19	20	23	30	33	1.36	1.74

INLAND WATER FISHERIES

Section 2. Fisheries in Rivers and Lakes

Rivers and lakes, except some special areas, are public waters. So the fisheries to be operated in these waters, for the purpose of conserving fishery resources, are regulated in several aspects under the Fisheries Law, the Fishery Resources Conservation Law and other related laws and regulations. Fishery rights are granted mainly to those fishermen's cooperatives which are organized by inhabitants in areas adjacent to the inland waters fit for the propagation of aquatic animals and plants.

Table 35. Production by River and Lake Fisheries (1964)
(Unit: ton)

	Rivers	Lakes	Total
Total	48,762	40,438	89,200
Fish	28,616	22,165	50,781
Shellfish	19,413	15,616	35,029
Other fresh water animals	569	2,485	3,054
Fresh water weeds	164	172	336

Fishermen's Cooperatives charge dues to their members concerned and fishing fares to sport-fishermen. These dues and fares are used for the expenses in management and propagation. These cooperatives are organized all over the country and are making a contribution toward the conservation and cultivation of fishery resources through the stocking of seedfish and construction of spawning grounds. Various regulations are also applied to inland fisheries. Some fishing rights are granted only to the members of cooperatives. The use of specific gears is permitted in some fisheries and are open in some fisheries.

The number of fishermen engaging in the inland water fisheries amounts to 570,000, of whom almost all, except those engaging in fisheries in lakes or large rivers, are usually working in farms or forests.

The fishing gears are generally simple and can be operated by one person including pole and line, long-line, gill-net and small setnet. As a unique fishing method, the fishing with cormorant in the Nagara River can be mentioned; it is the well known "ayu" (sweet-smelt) fishing with tamed cormorants. There are also large type fishing methods such as fishing with weirs or beach seines crossing the streams.

Table 36 shows the production in 1964 by inland water fisheries by species. The commercially important fishes in rivers are "ayu", eel, carp, crucian carp and corbicula and those in lakes are pond smelt, corbicula and shrimp. 'Ayu', a special fish in Japan, is not only considered to be the most delicious freshwater fish in the world, but is also rated very high as the object of sport-fishing. Its production in 1964 amounting to 9.8

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Table 36. Production by River and Lake Fisheries and Catch Value by Species (1964)

	Quantity (tons)	Value (1,000 \$)
Anadromous salmon	2,651	1,008
Landlocked salmon	1,225	992
Pond smelt	5,080	1,286
Lancelet	992	436
Ayu	8,101	9,833
Carp	2,791	2,294
Crucian carp	8,896	2,050
Dace	3,350	1,836
'Oikawa'	1,848	489
Eel	2,776	1,210
Loach	1,006	836
Grey mullet	2,214	675
Goby	2,814	414
Bullhead	157	69
Others	6,880	3,111
Fishes total	50,781	26,539
Corbicula	33,526	558
Others	1,503	622
Total	35,029	1,180
Other fresh water animals	3,054	425
Weeds	336	53
Grand total	89,201	28,197

million dollars in value occupied 35% of the total production by river and lake fisheries which reached 28.2 million dollars.

With regard to anadromous salmon, landlocked salmon and dace, through stocking of fry, construction of spawning grounds and protection of spawning and breeding places, their propagation measures are being taken separately or jointly. As to the salmon which are caught in the Northern Pacific waters, some of them have their spawning grounds in the northern rivers of Japan. For the purpose of conserving their resources, artificial hatching and stocking of fry is conducted with the eggs taken out of adult fish.

The type of their distribution in the river differs by species; landlocked salmon such as char live in the upper stream, 'ayu' and dace in the middle stream and carp, crucian carp and eel in the down stream. In the mouth of rivers, carp and crucian carp as well as estuarine fish such as grey mullet, bass, lancelet and corbicula are largely caught. The mouth of rivers having high productivity is most fitted for taking seed fish for the purpose of 'ayu' and eel culture.

INLAND WATER FISHERIES

Section 3. Fish Culture in Inland Waters

The fish culture in inland waters is divided into four types: (a) culture in artificial ponds, (b) culture in natural rivers and lakes, (c) culture in irrigation ponds of farm land, and (d) culture in paddy fields, and (e) as a special type of fish culture, that of ornamental fish may be added.

The recent remarkable improvement of culture techniques and increased demand of cultured products have brought on a great change in the structure of production. With regard to the carp culture in paddy fields which was the mainstay of fresh water culture industry in prewar days, its production has greatly dropped owing to the aerial sprinkling of agricultural chemicals and the use of chemical fertilizers. As to (b) and (c) types of fish culture, because of the competition between irrigation and farming, their development is at a standstill. On the other hand, the position of (a) type, culture in artificial pond, has been improved because it can be operated intensively.

As culture feeds, the principal item in the past consisted of home-made feeds processed from silkworm pupa or seafish of lower class. But now the use of assorted feed chiefly manufactured from white fishmeal has come to be used widely and has improved the quality of feed and saved labor. Price has enlarged the production of feed and scale of management.

The industrialized cultures in inland waters include those of eel, carp, rainbow trout, 'ayu', grey mullet, crucian carp, loach, colored carp, gold fish, snapping turtle and fresh water pearl. The culture of bull frog and shrimp may be added though their production is limited.

Experimental culture is also being conducted on salmon, grass fish, landlocked salmon and cross-bred salmon and trout. With the development of culture techniques in the future, it is expected that the species will become more diverse. It is to be noted that the industrization experiments are being made on the freshwater culture of salmon and the seawater culture of rainbow trout, 'ayu' and eel (Table 37, Table 38).

1. Eel Culture

Eel culture is the most important in inland water culture and its production occupies 45% in quantity and 63% in value of the total production of all culture industries. Eel is one of the most popular and delicious fish foods in Japan. With the decreased production of natural eel, the production of cultured eel went up very high and has come to surpass that of natural eel by about five.

With regard to the producing areas, 82% of the total is concentrated in the central part of the Pacific coast between Tokyo and Osaka, where a liberal supply of seed fish (eel larvae) and other feeds (fresh fish) can

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Table 37. Production by Culture Industries

(1964)

		Production (ton)	Value (1,000 \$)
Total		29,780	30,969
Fish:	Total	29,486	29,989
	Rainbow trout brook trout	5,412	2,778
	Ayu	994	1,206
	Carp	7,557	5,814
	Crucian Carp	1,504	275
	Eel	13,418	19,567
	Grey mullet	601	339
	Others	0	10
Other fresh water animals:	Total	294	100
	Snapping turtle	29	100
	Frog	1	0
	Others	1	0
Fresh water pearl:		1	881
Ornamental fish (kg):	Carp	19,658	unknown
	Goldfish	147,738	"

Table 38. Production by Culture Industries

(1964)

		Quantity (tons)	Culture area (1,000 tsubo)	No. of managements	No. of regular workers engaged (persons)
a	Carp	2,531	845	2,320	3,520
	Eel	13,609	5,031	1,549	3,555
	Rainbow trout	5,181	262	933	1,842
	Ayu	955	76	249	616
	Others	88	72	49	159
b		3,861	26,295	1,685	6,166
c		3,315	10,945	3,806	10,992
d		240	6,692	37,748	0
e (kg)		167,396	2,305	4,573	5,657
Actual number			44,187	10,385	26,163

Note: (1) Actual number is the number of full-time workers.

(2) Tsubo = 3.3 m².

(3) Production includes the one by mixed culture with other fish.

(4) a: culture in artificial ponds.

b: culture in natural rivers and lakes.

c: culture in irrigation ponds of farm land.

d: culture in paddy field.

e: special type of fish culture

be procured. But with the recent development of seedfish culture of eel larvae in various parts of the country, the production in the new producing places is increasing rapidly.

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In 1964, a remarkable improvement was made in the culture techniques and distribution, and eel culture has come to enter a new stage of development in the following lines:

(a) The consumption of eel in the past was largely made through restaurants where the fish was cooked by skilled cooks and the lack of skilled hands was obstructive to the extension of consumption. But now with the development of automatic processing machinery the consumption has been extended to homes at large.

(b) As the result of the joint survey made by producers on the overseas market, it has been found that the export to Europe is promising and experimental export has been started. But for the present owing to the increased domestic demand by the development of processing machinery the export desire of producers is declining.

(c) The development of assorted feeds was retarded by the specific character of taking feed, but with the recent progress of commercialization, labor saving operation has come to be expected in the culture production.

2. Carp Culture

Carp culture in Japan has an old history and is carried on by farmers as their sideline in agricultural land all over the country. In prewar days carp held an important position in the supply of animal protein to the remote and secluded places in mountainous land, and in the War time, promotion measures for increased production were taken for the purpose of establishing the self-supporting policy of animal protein. With the increased demand after the War, as specific high-class fish, its production has jumped up. The breeding places include (a) the places where highly dense pond culture is made by making good use of rich supply of water, (b) the places where seed fish production is exclusively made by paddy field culture, (c) the places where extensive culture is carried on in rivers and lakes, and (d) the compound places where the above three types of culture are operated. These types have their own merits and are practicable according to natural environment and circumstances. There is another type of culture which has been recently developed and has come to be widely practised; this is done by rearing the fish in culture nets which is intensively conducted in lakes by fishermen with their fishery rights.

3. Rainbow Trout Culture

Rainbow trout was originally transplanted from the U.S. for the purpose of stocking in rivers, and its culture was developed to produce seed fish. After the War rainbow trout began to be exported mostly to

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America and with the increased domestic demand, this culture has made a great development.

As a link of the governmental policy for development of export industries after the War, the prefectural laboratories and experimental fisheries stations together with seed-fish producing centers were well equipped. In cooperation with the National Fisheries Research Laboratories which carry on the basic studies on fish culture and fish culture industries, efforts have been made to improve the culture techniques, by which gratifying results have been obtained in the improvement in the yield-rate during fish culture, in the rise of efficiency of feed, in the increase of production per unit area of culture ponds and in the adjustment of spawning season by shade culture.

4. Ornamental Fish Culture

While the hobby of breeding ornamental fish is undergoing a change from tropical fish to sea fish, the popular favor on the ornamental fresh water fish such as colored carp and gold fish which are indigenous to Japan did not make any change. On the contrary, their production is increasing yearly.

These two species are select breeds of carp and crucian carp, and they are cultured all over the country as sideline of farmers. Their culture method is divided into two types; rice field and small pond breedings. With regard to the culture of high-class or superior fish, since a long experience is required for their selection in the course of production, their chief producing districts or places are settled traditionally.

These high-class or superior fishes have been introduced to foreign countries through international sample fairs and others from old times and have gained public favor abroad as specialities of Japan. As to their commercial export, that of gold fish was commenced in prewar days while that of carp began lately. Even though the technical obstacles in live fish transport have been cleared by the development of air lines, the high cost of air transport still remains as a bottle-neck in the way of expanding their export. So studies are now being made on the development of low-cost transportation.



**Representative Fishing Village
for Coastal Fisheries
(Katsuura, Chiba Prefecture)**

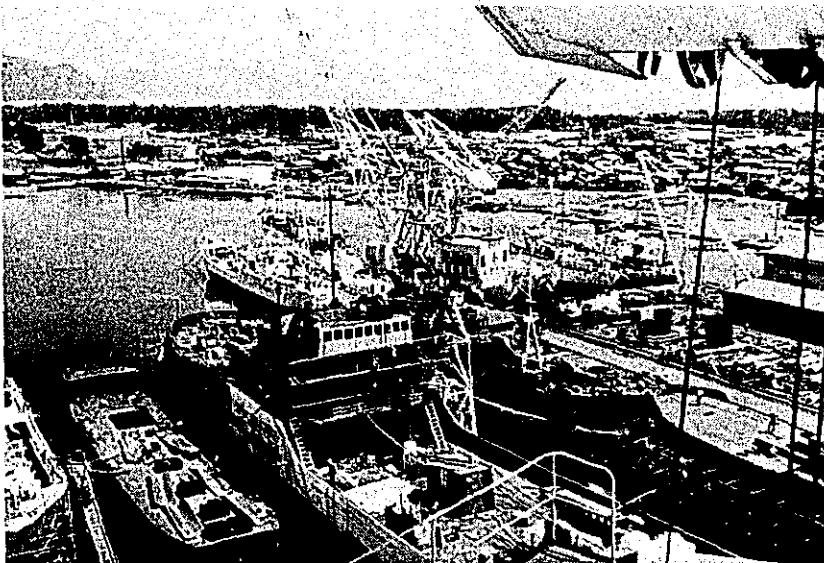
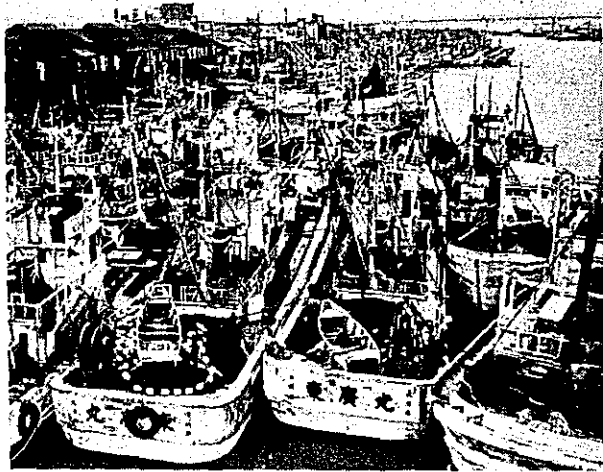
These efficient fishing boats are 3~10 Ts equipped with Diesel engines of 10 HP per ton, radars, fish finders, direction finders, etc. Their annual production is over \$10,000 in value. The hanging nets in front are lobster gillnets.

**Choshi Fishing Port
(Chiba Prefecture)**

This fishing port stands No. 11 in the value of its landed fishery products (1965).

The fishing vessels in front are purse-seiners, and those in the distance are medium trawlers, saury and tuna vessels.

This photograph was taken from the second floor of the Choshi Fishermen's Cooperative Association.



Shipbuilding Yard now in Full Swing

Miho Shipbuilding Yard in Shizuoka Prefecture mainly used for building tuna and skipjack fishing vessels. (Mt. Fuji in distant view)



A fishing village on the Northern Pacific coast of Japan. All members of fishing household are engaged in the collection and drying of 'wakame' (*Undaria pinnatifida*) in April.



An apartment house for fishermen in the City of Onomichi, Hiroshima Prefecture. The first story of the house is used as fish landing places and offices of the Fishermen's Cooperative Association.



Bird's-eye View of Tsukiji Fish Market, Tokyo

About 10% of them are landed here directly by fishing vessels while 90% of them are carried in here by freight cars, motor trucks and cold-storage vessels.



Tunas landed at Tsukiji Fish Market, Tokyo and waiting for being auctioned.

The vessel on the right hand is a tuna fishing vessel of 240 Ts class which has come home after her long voyage for 3 months in the Eastern Pacific Ocean.



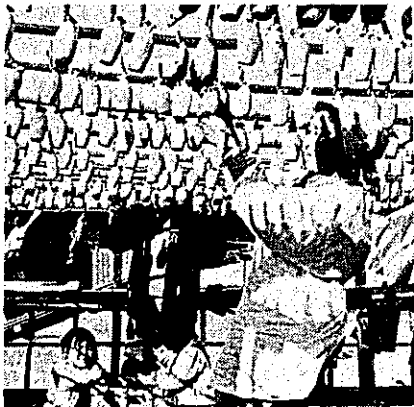
Auction in the Market

Auctioneer are selling tunas by auction along the lines of fish announcing the selling prices with their fingers.



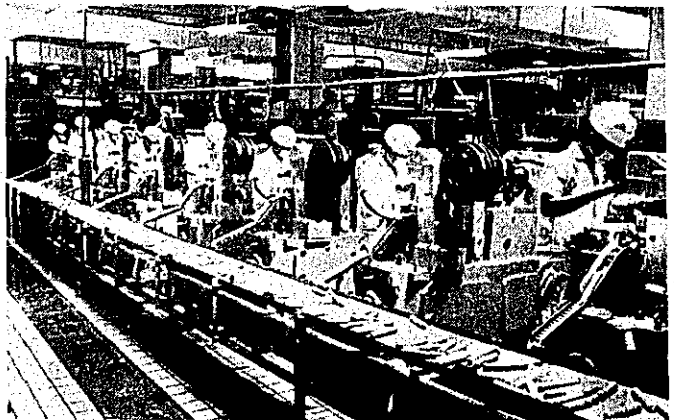
Fishing Base of a Large Fishing Company (Kurihama Plant of Nichiro Fishing Co. in Kanagawa Prefecture).

Large trawlers of 3,000 Ts can be moored alongside the quay. The buildings are cold stores having refrigerating capacity of 15,000 tons, canneries having daily productivity of 2,000 cases and fish sausage plants which produce 500,000 pieces a day.

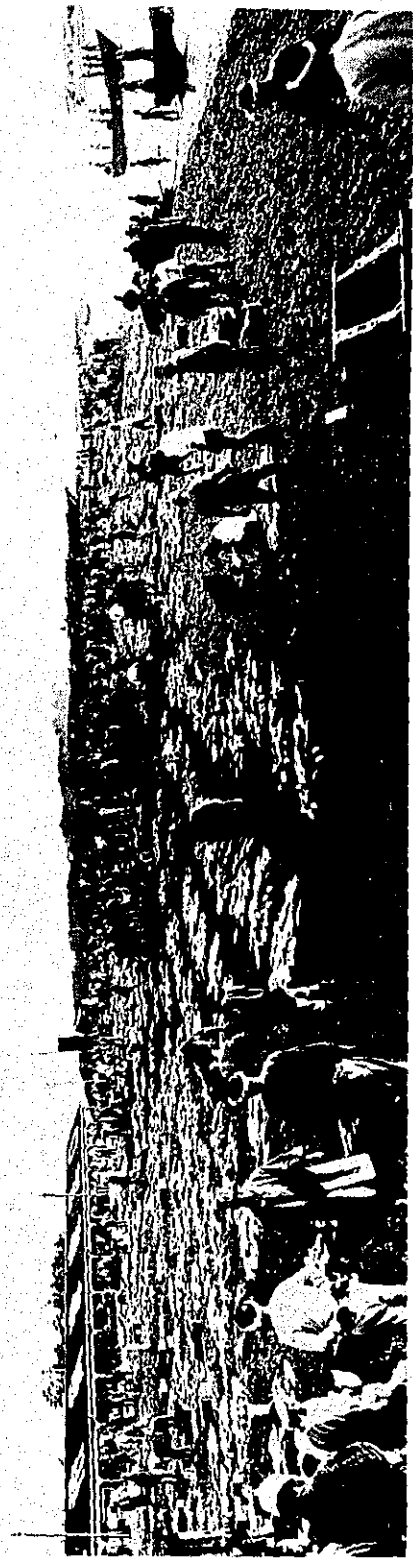


Traditional Processing of Squids in Iwate Prefecture

Drying scene of gutted and inflated squids. When 'sake' (Japanese wine) is put into the dried inflated squids and kept for some time, it will acquire a good flavor.

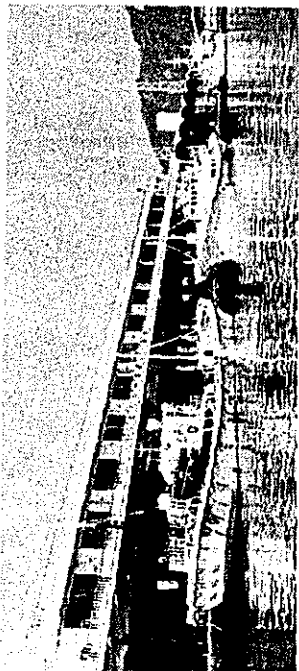


Workshop of Fish Sausage Manufacturing Plant (Kurihama Plant of Nichiro Fishing Co.)



Yaizu Fishing Port in Prewar Days

For want of fish landing port in prewar days, fish catches, mostly skipjack, were carried and landed on the beach by small boats from the fishing vessels lying at anchor out at sea and they were sold by tender or auction on the beach.

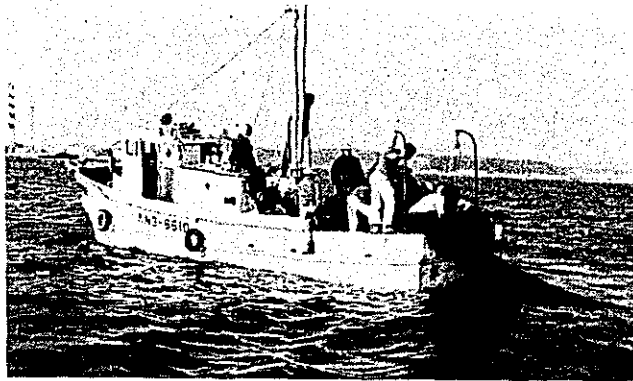


Yaizu Fishing Port (Shizuoka Prefecture)

Yaizu Fishing Port together with Misaki Fishing Port in Kanagawa Prefecture are the representative tuna bases in Japan, and its landing of tuna in 1965 amounted to 50 million dollars in value occupying the foremost position in this country.



Misaki International Fisheries Training Center, Overseas Technical Cooperation Agency.



Practical training by the Center.



Chapter VII

Overseas Fishery and International Cooperation

Section 1. Overseas Fisheries Cooperation by Private Enterprises

With the development of Japanese fisheries, the boundaries of fishing grounds have been extended farther and farther. In view of the advantageous conditions of disposing the fish catches at ports in the vicinity of the fishing grounds, on-the-spot dealings have been undertaken with the nearest countries. With regard to the countries which have good fishing grounds but are backward in fishing techniques, there are not a few countries which have made offer to conduct a joint operation with Japanese fishing industry for the purpose of developing their own fisheries through the introduction of Japanese techniques.

The first overseas entry of Japanese fishing companies was made in 1953 by the Taiyo Fishing Co. which established a joint concern in Burma. With a gradual development of such joint enterprise, the number of fishing vessels operating for this purpose reached 76 vessels in 1966 (Table 39).

Table 39. Number of Overseas Fishing Vessels

	Trawl- ing	Tuna fishery	Whal- ing	Others	Total	%
Central and South America	30	9	1	2	42	55
Southeastern Asia	20	6	—	—	26	34
Africa	1	2	—	—	3	4
Europe, Middle and Near East, North America	—	—	5	—	5	7
Total	51	17	6	2	76	
%	67	22	8	3		(100%)

The fishery cooperation was taken up for the first time between the South-Eastern Asian Countries and Japan as a means of enforcing the War Damage Compensation Program after World War II in the form of labor service. Such service consisted chiefly in the operation of trawlers. But owing to the ill-matched relation between boat-type or gear and fishery resources as well as to the difference of eating habits of the people, no remarkable progress was seen in the production and demand of fish. This labor service from Japan came to an end when the War Damage Compensation Program was terminated.

With the development of tuna fishing in the Atlantic Ocean around

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1957, the Japanese overseas fishery began to assume a positive attitude mainly in the waters of Central and South America. But the present progress of this fishing cannot be said to be very satisfactory because of rather small demand for tuna in those regions. But it is the latest tendency that with the recent active operation of prawn trawling instead of bottom fish and tuna fisheries, many fishing boats go out to the waters of Southeastern Asia and Central and South America. In addition to the fisheries mentioned above, pearl culture are being operated overseas to some extent by Japanese vessels and enterprises.

The overseas entry of Japanese fishing industry takes several forms according to the types of fisheries and circumstances of the countries concerned, such as (a) joint management, (b) chartered ship system, (c) marketing contract of fish catches and (d) borrowing contract of fishing bases and facilities, the commonest forms being (a) and (b).

The contract with developing countries takes for the most part (a) form for the purpose of backing up the promotion of their fishing industry. In this case, more than half of the capital and crew members are provided by those countries. The contract with developed countries takes several forms, but (c) form is the commonest of all, that is, contract of landing and marketing of catches with those countries. One of the typical contracts of fish marketing is that of tuna marketing between Japan and America at Samoa Island which was concluded more than 10 years ago. Now 30 to 40 Japanese tuna vessels are operating in this area. With regard to such special fisheries as pearl culture, the forms and details of their contract vary according to the state of things.

The catches by the overseas fishing in 1950 were only 680 tons, but they went up to 27,000 tons in 1966 (Figs 14, 15).

The catches of bottom fish by trawlers which reached 15,000 tons in 1961, the highest point of production, are now tracing a gradual declining way. At the same time the tuna fishing, which was initiated in 1959 and went up very high ever since in its production, is now showing a declining tendency after 1963. Such downward tendency has been brought forth by the recent debouchment of Korean and Formosan fishing vessels in the waters around the Samoan Islands and others on the one side and by the switch-over of the operation of Japanese large tuna vessels in the Atlantic to the operation in the Indian and Pacific Oceans on the other side, which makes it easier to carry back their catches. The strong demand for tuna in Japan has boosted up the home price to the advantage of fish landing in the home country.

A remarkable development has recently been registered in the production of prawn. The landing of 247 tons in 1961 jumped up to 7,700 tons in 1964. With the strong world demand and high price of prawns and with the economical production by medium trawlers of 50 to 99 Ts, this fishing can be said to be a very stabilized operation. What is better

OVERSEAS FISHERY AND INTERNATIONAL COOPERATION

Fig. 14 Change in Production by Types of Fishes

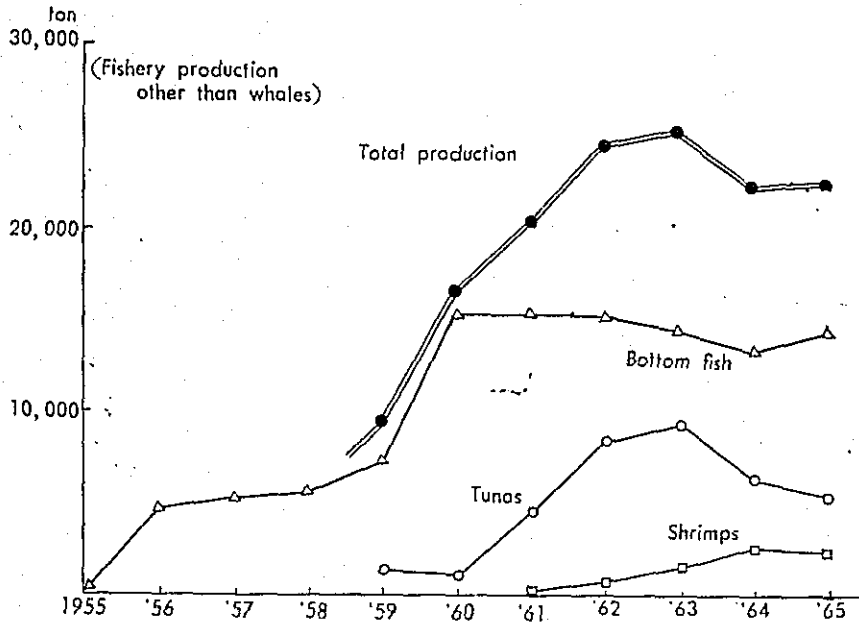
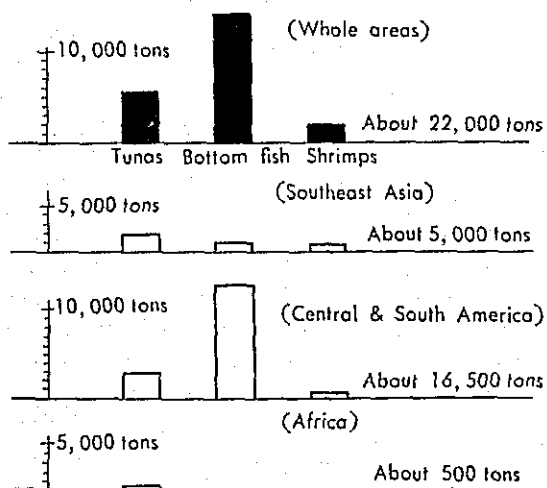


Fig. 15 Fishery Production by Areas (1965)



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still, the resources are distributed far and wide in the coastal waters of temperate and tropical zones. This fishery is briskly operated in Venezuela and Guinea in South America as well as in South East Asia, and the catches in the former area are exported mainly to the United States and those in the latter area, to Japan. The Japanese import of prawns in 1960 was limited to 625 tons, but it is anticipated that the import in 1967 will jump up to 40,000 tons owing to the strong demand of the Japanese people.

Overseas Japanese fisheries have double objects; one is to assist those countries in the development of their fisheries, and the other is to make own profits. With regard to the results of the latter case, they cannot be said very successful. According to the statistics prepared by the Fisheries Agency, the percentage of the successful and unsuccessful enterprises is 50 to 50%. Even those successful enterprises, only three of them, could remit money to Japan in the form of dividend amounting only to 900 dollars each, showing the low merit of capital investment in the present stage.

Generally speaking, since the overseas fishing is operated under entirely different conditions from Japan, it is considered very difficult to make profits in a short time, and it is required to make investigations before investment and to establish a long-term project.

With regard to the prospects of fisheries, they vary greatly with their types. Tuna fishing and trawling are mostly dull because of the competition with foreign vessels and the restricted market of catches in foreign countries. And there are also many cases where the fishing operation is restricted by the deficiency in supplies and equipment of fishing vessels and gears as well as in cold-storage of catches. On the contrary, the prospects of prawn fishing are rather fair, because these shellfish are rich in resources, and being small in size they are easy to be stored even in refrigeration plants of small type in developing areas and are easy to be exported.

Section 2. International Fishery Technical Cooperation by the Government

For the purpose of fisheries development in foreign countries, the Japanese Government is also making an active cooperation. As an example of multilateral agreement, under the International Agreements, FAO and UNESCO, Japan has sent and is sending out fishery specialists and scientists to other countries; and at the same time on a bilateral basis, under the Colombo Plan, Middle and Near East and Africa Technical Cooperation Plan, Central and South America Technical Cooperation Plan and North Eastern Asia Plan, 142 fisheries specialists were already dispatched to respective countries by 1965. The largest scale coopera-

OVERSEAS FISHERY AND INTERNATIONAL COOPERATION

tion is the establishment of the fisheries training centers in India and Ceylon, in which the fishermen on the spot are trained in various branches of fishing industry.

With regard to the Republic of Korea, with the restoration of diplomatic relation with Japan in 1965, the Fisheries Treaty was concluded between the two countries. Under the Treaties, financial and technical help has come to be given to the Republic of Korea and its details are to be discussed every year between the two countries.

The training in the country for the government officers and fishermen of foreign countries under the inter-governmental technical cooperation plans has been developed year by year in scale. One of the best equipped training facilities is the Misaki International Fisheries Training Center at Misaki Port, Kanagawa Prefecture, which is famous as a tuna fishing base. This training center can accommodate about 30 trainees from the countries of Southeast Asia, Middle and Near East, Africa, and Central and South America; and those who completed their training courses in this institution reached 102 persons. Besides, the Fisheries Research Laboratories of Fisheries Agency are also undertaking the training of this kind in their institutions.

The Overseas Technical Cooperation Agency, which was established by the government in 1962, is in the service of such governmental-level of technical cooperations.

Distribution and Processing of Fishery Products

Section 1. Distribution of Fishery Products

1. Complexity of Distribution Structure

The distribution of fishery products has very complicated structures, because the production is in charge of small producers scattering along the coast all over the country, while consumption is made by separate homes in areas away from producing districts. Such conditions are making the relation between these two factors very complicated. And, because of the easy decomposition and diverse qualities of fishery products, it is difficult to fix their prices, and their revaluation must be made several times in the course from production to consumption. Especially since the amount of consumption of fresh food items is very big, and it occupies 35% of the total sum (1964), their distribution assumes very complicated forms.

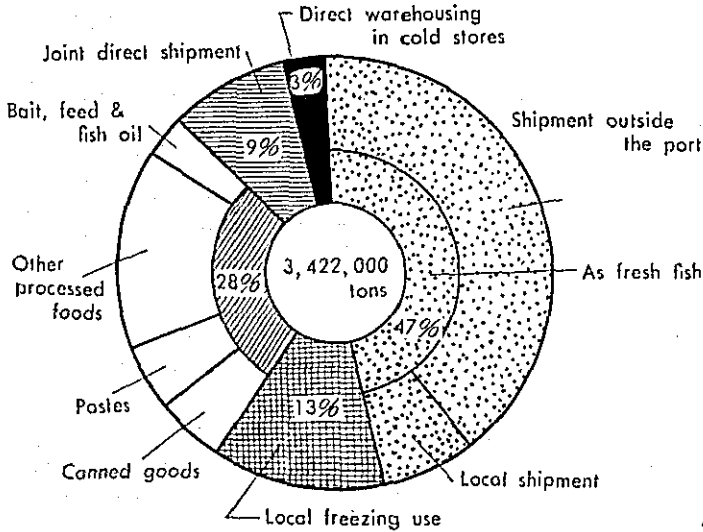
With the development of fisheries and increased scale of their management, the movement for simplifying the complicated route of distribution is started by the direct shipment to markets in consuming centers, without passing markets in producing centers, and by producers' combined business with the processing industry, by which processed goods are sold through their own outlets just like large fishing companies. But in view of the present situation in Japan, where fisheries are operated by many small coastal fishery households, it is not an easy task to simplify the structure of distribution at once.

With regard to the easy decomposition of fishery products, its countermeasures have been considered continuously from old times. With the recent development of processed fish foods and frozen fish, "the cold chain system" has come to be adopted here and there. But in Japan where transport facilities are well developed and people like to eat fresh fish, "the cold chain system" is not easy to be adopted intensively.

Fig. 16 shows the outline of distribution of fishery products from important producing centers in the country amounting to 248 ports. Of the fishery products landed at these ports amounting to 3.44 million tons, those directly shipped by producers and by joint-shipment, and directly transported to refrigerators without passing the markets of producing centers, occupy only 12%, and the rest corresponding to 88% are sold by auction or tender at the markets of producing centers, of which 47% is distributed for fresh fish, 28% for processing on the spot, and 13% for freezing on the spot.

DISTRIBUTION AND PROCESSING OF FISHERY PRODUCTS

Fig. 16 Shipment of Fishery Products from 248 Fishing Ports

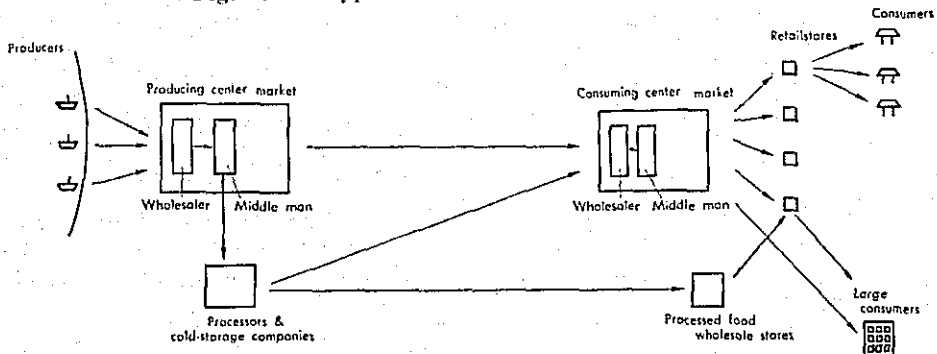


With regard to the fishery products shipped outside for fresh fish use, some may be processed in the place where they have been shipped, and some of those allocated for freezing may be used for processing. Further, some of the fishery products processed on the spot may be shipped to distant processing places, where they are to be processed into higher grade products. Under such complicated circumstances, it is difficult to grasp the actual status of distribution of fishery products.

2. Gaps in Distribution of Fishery Products

In order to clarify the matters involved in the distribution of fishery products, a typical distribution pattern is explained as follows: (Fig. 17)

Fig. 17 A Typical Distribution Pattern of Fishes



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- (1) Each producer returns to the fishing port carrying his catches;
- (2) The fishing port has a wholesale market where fish catches are purchased by middlemen through the wholesale agent of the producing center by auction or tender;
- (3) The middlemen who have brought the catches ship them to the market at consuming center;
- (4) The wholesale agent at the consuming center receives the catches from the middlemen of the producing center, and sells them by auction or tender to the middlemen at the market;
- (5) The middlemen at the consuming center sell them to retailers by auction.

This is the most typical and simple pattern of distribution of fishery products. But in the case of large producing and consuming centers, they have several wholesale agents in the same area and they also have primary and secondary middlemen at the same time, making the market structure very complicated. Further, some of the fishery products are shipped from their producers directly to consuming centers or are processed by producers themselves, and some of them are purchased from middle men or shipped by processing or cold-storage agents in producing or consuming centers.

The latest high-growth of economy in our country, as mentioned in Chapter I, has brought a rise in consumer prices. The contributory rate of fishery products in the rise of the general consumer price has reached about 10% lately, and as a result the backwardness of fishery product distribution has been disputed now.

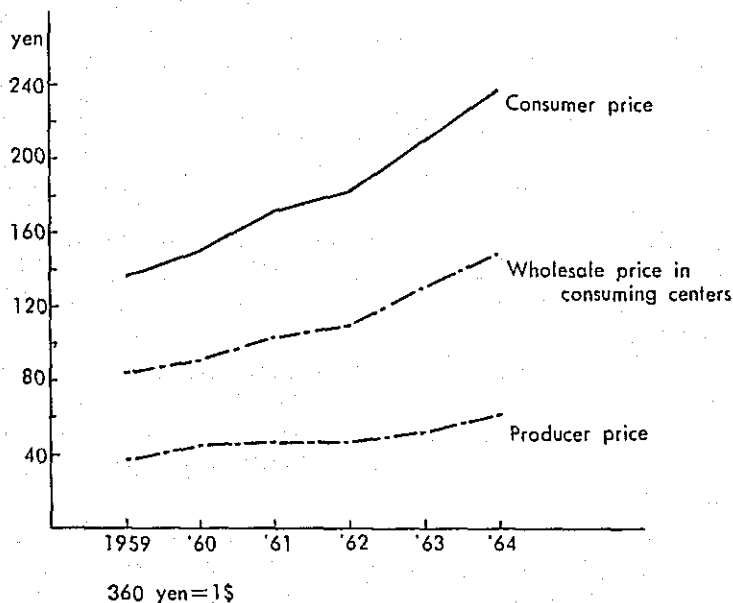
Fig. 18 shows the difference and change in the prices of fishery products during the years from 1959 to 1964 relating to the producers' price, wholesale price in consuming centers and consumer price, indicating an increasing tendency in their differences in these six years.

For the purpose of investigating the matter, the Ministry of Agriculture and Forestry conducted a follow-up survey on the price formation of important articles of food including fishery, agricultural and livestock products in 1964. As a result, the actual purchasing price of fishes by the consumers was found to be 2 or 3 times higher than the price in producing centers. Such disparity in their prices is caused by the complexity of distribution, where margin is added to the prime price at each stage, especially the high margin at retail store. As a countermeasure, the necessity is keenly felt for carrying out the mergence of the middleman and broker in producing and consuming centers, improvement of the equipment and business of fishmarkets, and enlargement of retailers by combination, especially for carrying out the curtailment of distribution processes.

One of the causes of the recent increase in consumer prices is the

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Fig. 18 The Price of Fishes



rise in wage levels of the persons engaged in the distribution business. The reason why the margin rate in retail stores is as high as 30% of retail price is attributable to the small scale of managements, of which 65% have only one or two clerks. And the small scale of managements is partly caused by the handling of decomposable food. So, without the extension of the cold chain system, the solution of the problem of fishery product distribution cannot be expected.

3. Markets in Producing Centers

Fishing ports are provided with markets, refrigerators, processing plants, repair shops of fishing boats and gears, crew's lodgings, radio communication systems, etc., of which markets are most important. Fish markets not only play an important role in the landing, distribution and price determination of fishery products, but also in granting credit to producers and distributors and in smooth management of business.

According to the investigation made by the Fisheries Agency in 1965, the producing markets in the country amounted to 1224, 90% of which were operated by fishermen's cooperatives, provided with landing facilities and building sites, and only 9% by companies. With regard to the management of fish markets, there are many fishermen's cooperatives which are carrying on business by themselves, including the landing of fishery products, auction, tender, settlement of accounts, offer of credit, management of attached facilities of markets, etc. (Table 40). In this way, fish-

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Table 40. Owners and Managers of Markets of Producing Centers

	Total	Public corporations	Fishermen's cooperatives	Companies	Individuals	Others
Owners	1,224 (100.0)	22 (1.8)	1,083 (88.5)	81 (6.6)	37 (3.0)	1 (0.1)
Managers	1,224 (100.0)	4 (0.3)	1,060 (87.0)	109 (8.6)	43 (3.4)	8 (0.7)

ermen's cooperatives can be said to be the center of producing markets. But large fishing ports used as bases of pelagic fisheries, such as Nagasaki and Shimonoseki, mostly belong to public corporations and are operated by companies.

It was about forty years ago that cooperatives started marketing business. Until that time there was a long struggle between producers and merchants to take the leadership. It is after World War II that producers have come to occupy a dominant position in the marketing in the producing centers.

Of the markets in producing centers amounting to 1,224 in total, 77% are in the towns and villages having population of under 50,000. The average amount of money handled by one market is 550,000 dollars, and the number of middle men participating in the market is 4.5 in average, that of retailers, 22 and that of coldstoring and processing dealers 7.9.

With regard to the selling commission, the larger the scale of market is, the lower the commission is, vice versa: and 52% of the total markets charge 3~5% commission. Compared with the market operated by merchants before World War II when 10% or more commission was charged, it is noticeable that a great improvement has been made in this field. Furthermore, a part of the official selling commission is repaid to producers as bounty for landing. This rebate system has been established as a means of inviting fishing vessels to the market as many as possible, and it resembles a service competition among the wholesale agencies at fishing ports.

A part of the money rebated is given as a reward to the middlemen who have bought fish catches at the market and other participants in the market, who have paid their prices by the appointed time to the wholesale agencies. The net proceeds of the wholesale agencies, therefore, are the balance in hand after paying out the cost of management and rebates. This balance money is a part of the financial basis for the activities of cooperatives.

The fishery products landed at the markets in producing centers, except those purchased for purpose of refrigeration, processing and retailing, are transported in fresh form to their consuming centers. As to their

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transport means, around 1958, 60% of them was transported by freight car, 26% by truck and 14% by ship, but in 1964, the rates changed into 43%, 43% and 14% respectively, showing a great increase in the transport by trucks.

The producers who have landed their fish at the market of producing centers can receive their price on the same day if they so desire because fishing vessels other than local vessels change their landing places from time to time. The settlement of accounts relating to fish prices is made as a rule within 3 days. As for the collection of prices from brokers and other participants in the market, 7 to 15 days' period of grace is granted.

The wholesale agencies of the market cover the balance between payment and receipt by the working fund from a bank. In this way through the offer of credit from the market, fishing vessels are able to make preparations for going out fishing at all times and middlemen can attend to their business with a sense of security.

4. Wholesale Market in Consuming Center

There are two types of wholesale markets in consuming centers. One is the central market, the establishment of which is made by the grant of the Minister of Agriculture and Forestry. The other type is called the local market and its establishment is granted by the prefectural governor. As of 1965 there were 24 central markets and 597 local markets in the whole country.

The central wholesale markets are located in large and medium cities. The markets in Tokyo, Osaka, Nagoya, Kobe, Kyoto and Yokohama are specially large, and those in Tokyo, Osaka and Nagoya function not only as markets in consuming centers but also as those in producing centers (Table 41). The 24 central markets handle fishery products of 706 million dollars in a year.

The Tokyo Central Wholesale Market at Tsukiji, the greatest among them, is a mammoth market, and in 1965 it landed fishery products amounting to 691,000 tons, which means 2,000 tons a day and 290 mil-

Table 41. Central Wholesale Markets
(marketing only fresh fish) (1965)

No. of markets	24
Total proceeds (mil. \$)	706
Proceeds per market (mil. \$)	15.3
No. of middleman (persons)	149
Proceeds per capita (\$1,000).	163
Participants (persons)	153
Proceeds per capita (\$1,000)	27.6

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lion dollars in value. In this market there are five companies functioning as wholesale agencies, which receive fishery products from the shippers in producing centers. These companies are either subsidiaries of large fishing companies such as Taiyo Gyogyo Co. and Nihon Suisan Co. or companies closely related with them in capitalization.

The middlemen in this market amount to 1587 persons who are mostly specialized in different fields; middlemen of large fish such as tuna, those of high-class fish such as prawn and crab, etc. There are also small middlemen who buy various fish from large middlemen, and sell them to buyers who come to the market. The persons who purchase fish from middlemen are fish processors, retailers, restaurant owners and shippers to local markets. Those who come to the market every day amount to 45,000 persons and the majority of them are retailers and purchasers from restaurants. The general consumers other than large users such as army, hospitals and restaurants do not come to the market because they can purchase fish desired at the retail stores found at the corners of streets near their homes.

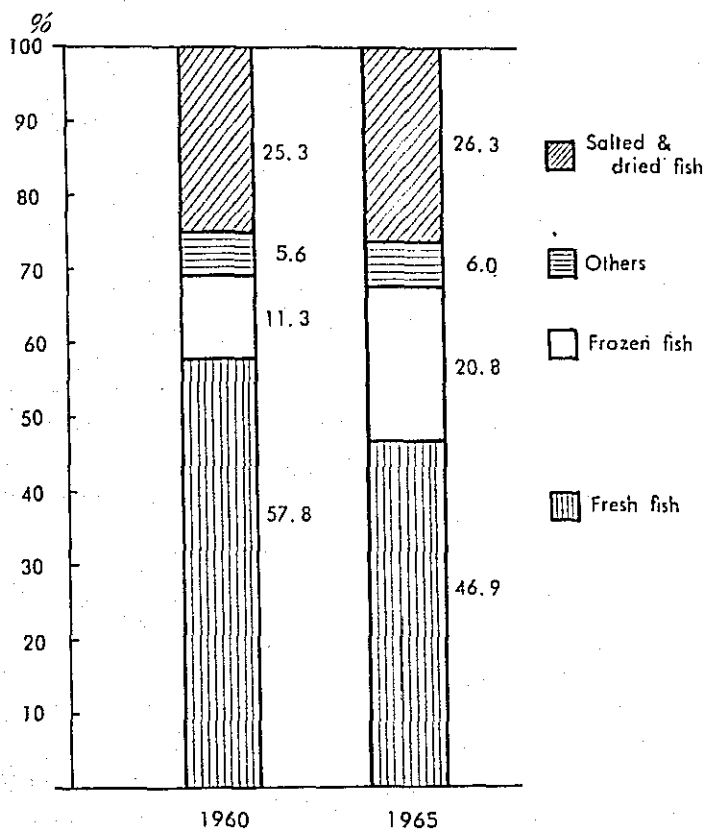
The Tsukiji Market handles 2,000 tons of fishery products a day. These products are sold through the wholesale agencies to middlemen by auction and tender in the limited period from 5 to 7 o'clock in the morning, and then middlemen resell these products by about 10 o'clock. In this way the market which is very busy and crowded in the morning is hushed entirely in the afternoon. This market supplies fishery products to the people of Tokyo amounting to about 10 million in number, and at the same time it reships 40% of the receipt to its neighboring prefectures. In this way, the Tsukiji Market is not only a consumers' market, but it is also performing important duties as a distributing center of fishery products. This tendency is prevailing more and more of late.

With regard to processed products, though their use is on the increase year by year, a considerable amount of them is not handled by fish markets and the percentage of those handled by fish markets is low compared with their production. The fishery products handled by central wholesale markets are mainly those to be consumed in fresh form, but recently an increasing tendency is seen in the handling of frozen fish instead of fresh fish (Fig. 19). Since retailers thaw frozen fish and sell it in the form of fresh fish, it cannot be said that they are making a full-scale operation of the cold-chain system.

Wholesale agencies in consuming centers usually settle accounts to shippers from the markets of producing centers within a week, and allow the settlement of price for 2 weeks to one month to the brokers who have bought fishery products, and the working funds of the wholesale agencies are usually financed by a bank. The offer of such credit expedites the smooth distribution of fishery products. For the purpose of encouraging the producing center to make shipment of fishery pro-

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Fig. 19 Percentage of the Marine Products handled at the Central Wholesale Market



ducts, the wholesale agencies give rebate to the shippers who settle their accounts before the time limit. The commission chargeable by central wholesale markets to shippers is fixed by the Minister of Agriculture and Forestry at 5.5%, but the actual commission becomes a little lower than this when the rebate is taken into consideration.

5. Fresh Fish Retailers and Others

Retailers of fresh fish and processed fish carry on their business independently in most cases. Processed fish retailstores sell not only processed fish, but also other kinds of processed food. With regard to fresh fish retailstores, there are about 51,000 stores in the country, and no change is seen in their number for these 4 years (Table 42). Most of them are very small in scale employing 2 or 4 shop-assistants. The percentage of those employing under 2 persons is 65%, and that of those employing under 4 persons is more than 90%. The average floor space

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Table 42. Operation of Fresh Fish Retailstores

	1960	1962	1964
No. of shops	51,521	50,453	51,492
% of the shops having regular employees			
under 2 persons	64.3	65.5	64.9
under 4 persons	91.9	92.8	93.1
Scale of business per shop:			
No of regular employees (persons)	2.6	2.5	2.6
Annual proceeds (\$1,000)	6.2	8.2	10.5
Store area (m ²)	18.3	18.9	—
Proceeds per capita (\$1,000)	2.4	3.2	4.1
Gross profits (%)	21.2	20.9	20.6
Net profits (%)	3.2	3.2	2.9

of these stores is also very small, occupying only 18–19 m². Because raw fish is used widely and constantly, retailstores are required to be located within 1 km at the outside from homes, so that housewives may visit the stores every day to purchase what they like. This is the reason why many fish retailstores are found all over the town.

Besides, a fish retailstore, as well as other ones, was an easy business for superfluous manpower to undertake since it requires little skill and only a small capital. Even now when the shortage of labor is at issue, the number of small retailstores, not to speak of fish stores, in Japan is greater than that of advanced countries.

With regard to the margin rate of 30% by fresh fish retailstores, it has brought about a public discussion as a result of the recent rise in consumer prices, but it can not be said to be high because it corresponds to about 3% of the net profit rate of the proceeds of sales.

The reasons for the high rate of margin are as follows:

- (1) Small scale of management and marketing small quantity and large variety of items reduce the efficiency;
- (2) Because of the septicity and perishability of fishery products, some quantities should be allowed for waste;
- (3) Because of the complicated cooking method of fresh fish, fish dealers are requested by housewives to take off heads, entrails, bones and skins of fish. Especially with the increased income level of people and the improvement of women's position after World War II, housewives have come to dislike the troublesome handling of fish.

For such reasons and under the present elevated wage level through the shortage of labor, it seems to be hopeless to reduce the margin rate.

In 1966 the Ministry of Agriculture and Forestry held the Council for Perishable Foods Retailsale Modernization and began to study the rationalization of distribution of foodstuffs along the following lines:

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- (a) Amalgamation and combination of managements for the purpose of enlargement of the scale of retail trade;
- (b) Rationalization of stocking of fishery products through the development of voluntary chain system;
- (c) Introduction of prepackage system;
- (d) Establishment of cold-chain system.

With regard to the super market system which serves great deal for the rationalization of distribution, it has made a speedy development in these ten years, but is still in a way to development in Japan. The super markets with shopping floor space over 300 m² numbering only 77 stores in the whole country before 1957, went up to 818 in 1965. These super markets handle frozen fish on cold chain system. If frozen fish has come to be handled by retailstores, small stores will be readjusted and the modernization of distribution will be promoted.

Section 2. Fish Processing Industry

1. General View

Fishery production in the recent five years increased from 6.19 million tons in 1960 to 6.91 million tons in 1965. With regard to the apportionment of use, however, the fishery products used in fresh form (excluding frozen food) underwent a great decrease in the same period from 1,139,000 tons to 655,000 tons showing only 9% of the total production in 1965. On the other hand, those used as processed products increased from 4.87 million tons to 6.25 million tons showing a speedy increase of 1.3 times. As to the production rates of several processed items, the rate of frozen, paste, salted and dried foods is high, but among them the production of salted and dried food has recently slowed down to some extent. The highest rate of growth, especially in recent years, is seen in the production of frozen food (Table 43).

Table 43. Domestic Production and Uses (live-weight)

	(Unit: 1,000 tons)						
	1960	1961	1962	1963	1964	1965	%
Total production	6,193	6,711	6,865	6,698	6,351	6,910	100.0
Fresh	1,319	1,277	1,144	1,170	754	655	9.0
Processed	4,873	5,434	5,721	5,528	5,596	6,254	91.0
Frozen	873	1,086	1,207	1,292	1,353	1,799	26.2
Canned	490	550	494	454	456	449	6.6
Paste	1,056	1,188	1,345	1,406	1,499	1,633	23.7
Salted, dried or smoked	1,602	1,669	1,720	1,732	1,562	1,665	24.2
Oils, fats, baits or feeds	769	843	851	579	669	644	9.4
Unedible weed dried	84	98	105	64	58	64	0.9

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With regard to the frozen fishery products, there are three types:

- (a) Products made in fillet form by removing heads, guts, etc.;
- (b) Round frozen products to be supplied to canning or other processing plants;
- (c) Products to be sold as fresh food after ice is thawed in consuming centers.

The number of the managements of fish processing industry in 1964 reached 202,000, of which as many as 156,900 were occupied by seaweed processors. With regard to seaweeds, they must be dried first, and then they are shipped as processed food. Thus properly speaking their dryers are fishermen, not processors. Of the total managements amounting to 202,000, 38,500 managements are special processors and the rest are side-jobbers. The side-jobbers not only include those fishermen who carry on processing industry but also those managements of rather a large size which may be regarded as special processors. When both types of these managements are summed up, the total number of special processing managements amounts to about 50,000. With the recently increasing demand for processed fish foods, their production has registered a speedy increase, and the production facilities have been modernized.

The increased demand for processed fish foods has been brought forth by the change in the people's diet life from starchy food to albuminous food by the rise in their incomes. The rising rate of incomes in these days is higher in the low income-groups, and it has brought the increased demand for fishery products. As affairs now stand, the increasing demand for albuminous foods will continue for five years with the rise in people's incomes. But as the national life of this country reaches the present level of that of European people, their demand for albuminous food will be shifted from fishery products to live-stock products. Such a tendency has already been noticed between low-grade and high-grade fishery products. For example, the production of salted and dried products shows no marked change and their relative importance in the entirety of fishery products is declining year by year.

With the increased demand for processed products, the problems of obtaining materials and the rise in their prices has become acute, and because of the strong demand for fishery products at large, there is a keen competition in the shares of materials between fresh fish users and processed product users.

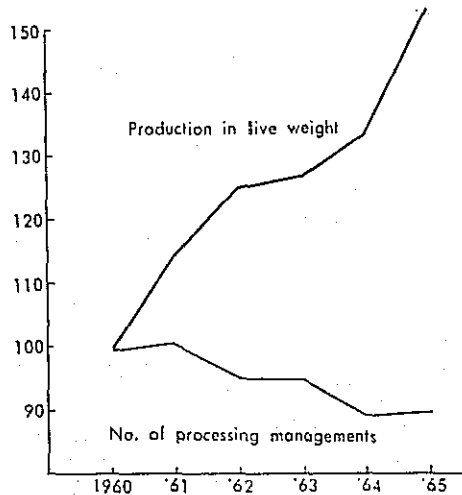
With regard to the fish processing industry, though there are many processors, their management is mostly of a small scale. According to the Fisheries Census taken in 1963, the managements having under 10 employees occupied 70% of the total. Even in the managements having as many as 10-20 employees, their employees were mainly housewives, and their wages were very low. These managements choose the best

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season for processing when fish are caught in plenty and their price is low, and make the best use of family labor power.

But with the recent rise in fish prices and shortage in labor power, the basis of small processing managements has weakened. Further the improved processing techniques and mass production have expedited the inroad managements of a large scale. As a result of the great change in the structure of the processing industry, the primitive management in fishing villages has been substituted by factory production form, and at the same time, processing on board factory ships by large fishing companies is making remarkable headway (Fig. 20).

Fig. 20 Production of Processed Fishery Products and Number of Managements (1960 = 100)



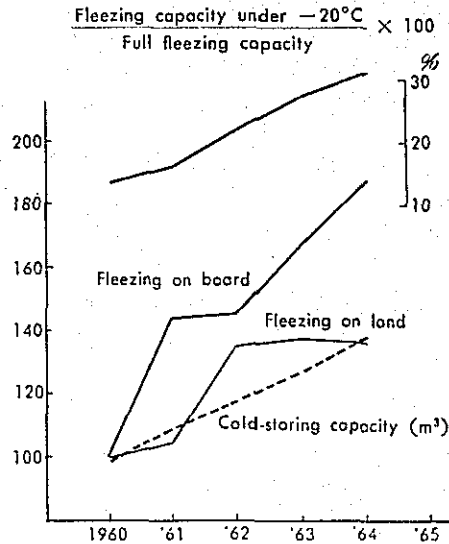
2. Freezing Industry

The production of frozen fish which was 873,000 tons in 1960 increased to 1,352,000 tons in 1963, and has jumped up to 1,800,000 tons in 1965. With regard to their production on land and on board during the five years from 1960 to 1964, the production on land increased from 563,000 tons to 766,000 tons showing the increase by 1.4 times, while that on board increased from 309,000 tons to 586,000 tons showing 1.9 times increase (Fig. 21).

The cold-storing capacity of freezing factories on land which was 3.6 million m³ in 1940 went up to 5 million m³ in 1964 showing 40% increase in only 4 years. In addition to the increased capacity, cold stores have become larger in size and more modernized. Before 1960, there was no large cold store with the storing capacity over 10,000 tons, but now there

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Fig. 21 Production of Frozen Fish and Fleezing Capacity
(1960 = 100)



are 14 stores. In 1960 the percentage of SA class cold storing rooms capable of freezing fish down to under 20 degrees below zero was only 13% of the total, but it went up to 31% in 1964, and now all the cold storages recently constructed belong to SA class.

The production of frozen fish on land, on the contrary, is at a standstill after 1962, as the result of natural fluctuations. Of the production on land amounting to 766,000 tons of frozen fish in 1964, 153,000 tons were skipjack and tuna, 139,000 tons saury, 97,000 tons mackerel, 86,000 tons squid, 44,000 tons horse mackerel, 44,000 tons sardine, and 192,000 tons of others. These fishes frozen on land, except skipjack and tuna, belong to the types of fish that are caught in large quantities seasonally and regionally and are cheap in price. Since the catches were difficult to be disposed of on the spot in former times, they were largely processed into fish meal. But now with the recent rise in food demand and increased number of cold stores, they have come to be used as processed food.

With regard to the production of frozen fish on board, it is much larger in quantity than that on land. The production on board is a necessary consequence of the long distance of fishing grounds and the improved susceptibility of consumers for the freshness of products.

The number of fishing vessels equipped with quick freezing machinery as of 1964 was 1,513, and almost all vessels of over 200 tons had quick freezing equipments. But now even vessels of about 50 tons have come to be equipped with the machinery. This increasing tendency is

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specially remarkable in tuna fishing vessels which make a long voyage, and whose catches are eaten in fresh form at home. Quick freezing equipments which have been improved lately into smaller and lighter types have come to be used effectively even in vessels of about 50 tons.

With regard to the quality of fish frozen on board, its freshness differs according to the capacity of cold-storing rooms, and the differences range at the rate of 20 to 30% in the value of fish. Under such situations, through a keen competition among fishermen, some vessels have come to be equipped with cold-storing rooms, which can lower the temperature down to under 40 degrees below zero. According to some specialists, the appropriate temperature of cold-storing rooms is around 20 degrees below zero, but as far as the quality of landed fish decides its value, the improvement of cold-storing rooms will continue. Though such improvement appears to be a wasteful way of spending money, it proves how sensitive the people are to the quality of fish.

Where the handling of frozen fish is concerned, the part allocated to the processing industry offers no problem, but the part allocated to retailstores to be used in fresh form is at times problematic. Since frozen fish is defrozen at retailstores and is sold as fresh fish, the cold-chain system from the producing center to the consuming center is broken. This means that the mistrust in frozen fish once harbored by consumers still remains in their heart. During the War and for a short period after the War, imperfectly preserved fish was produced and distributed in quantities, and consumers were inclined to undervalue frozen fish. It is not an easy task to get rid of their prepossession that the quality of frozen fish is low and untasty even now when fish is frozen immediately after being caught and is stored in rooms of 20 degrees below zero. Based on such preference of people for fresh fish, round fishes with head and tail are sold even at retailstores. If fishes caught are frozen after their inedible parts are removed on the spot, it will not only reduce the cost of distribution but also the remains will be manufactured into fish meal. Such measures are now being studied with a view to their adoption.

The price control of fishery products is one of the most important problems now. For this purpose, it is necessary to readjust the complex structure of the present distribution route, and to shorten the channel between producers and consumers. The establishment of cold-chain nets is considered the best way to this end, but the undeveloped taste of people for filleted fish is disturbing the timely establishment of the system and the development of production of frozen fish.

3. Canned Fish Products

The production of general canned foods during the period from 1960 to 1965 increased from 34.3 million cases (case = 1 lb x 48) to 36.3 mil-

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lion cases. But as to canned fish foods, the percentage of their production in the total production of all canned foods declined from 36% in 1960 to 32% in 1965. The production of canned fish foods remains almost on the same level from 11 million to 12 million cases, while that of canned foods other than canned fish is on the increases, especially that of canned mandarin oranges which is remarkable.

The reason why there has been no marked increase in the production of canned fish is not the low demand. According to the cross section method, the income elasticity value of canned fish foods was 0.51 in 1964. Such a phenomenon is regarded to have been brought about by the difficulty of procuring materials, and not by low demand.

With regard to the high-class canned fish foods, such as canned crab, and salmons, their production target is regulated by international conventions showing gradual decrease in quantities year by year, because of declining fishery resources in the face of the constantly increasing demand at home and abroad (Table 44).

Table 44. Production of Canned Goods

	(Unit: 1,000 cases)				
	1960	1961	1962	1963	1964
Total	11,997	12,288	12,194	11,392	11,613
Crab	313	342	333	333	324
Salmon	2,392	2,289	1,695	1,507	1,292
Tuna	2,626	2,942	2,692	2,785	2,769
Mackerel	1,220	1,464	1,819	2,160	2,450
Sardine	929	589	573	210	213
Saury	830	1,898	1,719	1,199	1,332
Horse mackerel	737	907	447	402	926
Whale	1,244	1,260	1,305	1,103	940
Shellfish	757	875	534	678	592
Others	949	—	1,077	1,015	775

As to the low-class canned fish foods such as canned sardine, horse mackerel and saury, though their demand is not so large as that of high-class fish, they have a constant demand, and their surpluses at home, if any, are exported to the countries in Southeast Asia. But their production is changeable according to the fishing conditions. Since the cost of cans used for low-class canned foods occupies 40% of the total cost, it is important to obtain the material fishes at low price. But owing to the recent increase in the production of frozen fish and other forms of processed fish, the canned fish industry is facing the shortage in the supply of the materials. With regard to mackerel, however, which are not fit for fish paste, the recent large increase in their catches is preventing the total production of canned fish from declining.

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(1) Canned Crab

The production of canned crabs is almost at a standstill. They are classified into two articles; canned king crab and other crabs, canned king crab being superior to other canned crabs. With regard to their production rates, about 70% goes to king crab and 30% to other crabs.

King crabs are caught by factory-type fishery in the Northern Pacific Ocean. In 1962, 10 fishing fleets were operated, but now they have been reduced to 7 fleets. The canned crabs are exported mainly to the United States and U.K.

(2) Canned Salmon

The production of canned salmon shows a yearly decrease. This is because under the Japan-Soviet Union Fisheries Convention the total catch of salmon is fixed, and owing to the decrease of the fishery resources, the production of both countries are on the decrease. In 1964, 11 motherships operated the fishery accompanied by 369 fishing vessels of 70-90 ton class.

(3) Canned Tuna

Because the production of tunas is also sluggish in these years, that of canned tuna does not grow well. The domestic demand of this food is not very great. Thus canned tunas are largely exported to the U.S. But the import restriction in the U.S. by the tariff quota is disturbing the development of this canning industry.

(4) Canned Mackerel

The annual production of mackerel during the four years from 1960 to 1964 increased from 351,000 tons to 495,000 tons. As a result, the production of canned mackerel was doubled. Since a package of canned foods containing three cans (weight per can = $\frac{1}{2}$ lbs) of sardine, horse mackerel or saury together with mackerel is marketed at a low price of 0.3 dollar, they are one of the favorite foods of low income earners.

(5) Canned Saury

The production of saury is subject to sharp fluctuations. Accordingly, that of canned saury is very unstable, and further because large parts of frozen saury are used as baits for tuna fishing and the fish culture industry, canning manufactures are suffering from the difficulty of obtaining materials.

Saury fishing grounds are the northern waters in the Pacific Ocean, where the U.S.S.R. fishing fleets are also operating saury fishery in recent years.

(6) Other Canned Goods

The production of horse mackerel is on the increase. But because it is unfit for canning, we cannot expect too much of the increased production of canned food. The production of canned whale meat is also on

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the decrease because of the decline in whale resources. Canned oyster, arkshell and short-necked clam occupy over 80% of the total production of canned shellfishes. Excepting the production of canned oyster, that of other items is somewhat declining.

4. Fish Pastes

Fish paste is a general term for fish foods manufactured from mashed fish meat adding spices and sugar. By the method of manufacture and by the fish used, fish paste is divided into several items, the important ones being 'Chikuwa' (fish stick), 'Kamaboko' (fish cake), 'Agekamaboko' (fried fish cake), fish sausage and fish ham.

(1) 'Chikuwa' (Fish Stick)

The main material of 'Chikuwa' is bottom fishes which are caught in the East China Sea and the Yellow Sea. Boiled fish meat is mashed, and spices, sugar and starch are added therein. Then the mashed meat is made into the tube form and roasted. The material fish for this product consists of low-class fish such as conger-eel. Because of the cheapness of products, they are a popular food of the people.

(2) 'Kamaboko' (Fish Cake)

Adding spices to mashed fish meat, it is steamed. Its material consists mainly of bottom fishes caught in the coastal waters of Japan. The quality of fish determines that of its products. As a high quality material-fish, lizard fish is used and its product is highly esteemed by epicureans.

(3) 'Agekamaboko' (Fried Fish Cake)

The method of making of this is almost the same with that of 'Kamaboko' but the only difference lies in the frying instead of the steaming. Low-class fishes are generally used as the material of this product. Some products contain vegetables and eggs. This product is a popular food of the people.

(4) Fish Sausage and Fish Ham

Fish sausage and fish ham are quite new products compared with the former three traditional products. Though the process of manufacturing these foods was devised in a laboratory before the War, their commercialization was delayed until hydrochloric rubber casing method was originated, and now the casing has been standardized to the vinylidene casing.

The production of fish sausage and fish ham which was 101,000 tons in weight in 1960 increased to 176,000 tons in 1964. The major cause of the extended use of these products is attributable to the H-bomb experiment by U.S. Army at Bikini Atoll in 1946. Driven by the apprehensions of pollution of tuna in the surrounding waters by radioactivity, the price of tuna at the domestic market declined sharply by 30%. Taking

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such opportunity, fish sausage and ham makers bought up tuna in great quantity and offered their nice and cheap products to the market, thus extending the outlet of these new foods all over the country.

The diet life of people is changing from the traditional rice to bread accompanying the wider use of ham and sausage of meat origin. But the narrowness of land is disturbing the development of stock industry and is causing the high price of meat. This is another reason for the increased demand for fish-sausage and ham.

With regard to the method of manufacture of these products, it is just the same with that of general sausage and ham except for their casing material. Because of the cheap unit cost of fish sausage, it was necessary to develop a very cheap casing material.

The major raw materials of fish sausage are tuna, whale, shark and pollack. With the recent decrease in the production of tuna and whale, a great quantity of pollack has come to be used. The main material of fish ham is tuna. The rate of production of fish sausage and fish ham about 10 years ago was 9:1, but now it has changed to 7:3. Higher grade fish ham is demanded by consumers. Table 45 shows the general production of fish pastes in weight, specified by products indicating their steady increase by years.

Table 45. Production of Fish Pastes in Weight

	(Unit: 1,000 tons)					
	1960	1961	1962	1963	1964	1965
Total	509	573	649	688	734	797
Fish stick	95	98	104	112	119	121
Boiled fish-paste	152	187	214	205	219	245
Fried fish-paste	153	155	179	196	205	234
Fish sausage & ham	101	123	142	158	175	188
Others	7	10	10	17	16	9

With regard to the raw materials of fish pastes, because of the high prices of fish and the competition with frozen fish and processed ones, their procurement is found rather difficult. As a means of settling the difficulty of procuring the raw materials, a new method of making frozen mince fish meat was developed 2 or 3 years ago. Since fish meat, once frozen, changes in quality and loses its glutinosity, frozen fish is unfit for fish pastes. But when fish meat is processed in frozen mince, it will maintain its glutinosity, and can be stored for a long time.

The processing method of frozen mince fish meat is as follows: minced fish meat is put in water; after agitating it in the water, the water is taken away to remove the inorganic substance and the water soluble albuminous substance, which is an obstruction to freezing. Then repeating the same process several times a little quantity of salt is added

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when water is put in for the last time. Then removing the water, sugar is added and mixed up, and finally the fish meat is frozen. The salt and sugar are efficacious for preventing the degeneration by freezing.

By the production of minced products, the raw materials which have never been utilized, such as Alaska pollack and horse mackerel, have come to be used as materials of all kinds fish pastes, and at the same time those inedible fishes that have been thrown away overboard by the high-sea mothership have come to be used as the material of fish pastes, and this can be called epoch-making.

5. Other Processed Fish Foods

(1) Cured Foods (dried food, salted and dried food, boiled and dried food)

The production of cured fish foods in 1960 was 275,000 tons and that in 1965 decreased to 262,000 tons. Dried squid, saury and horse-mackerel account for a large percentage of all cured fish foods. Boiled and dried sardine is widely used as a flavoring material of soup (Table 46).

Table 46. Production of Other Processed Goods in Weight
(Unit: 1,000 tons)

	1960	1961	1962	1963	1964	1965
Simply dried	51	38	45	47	36	40
Salted and dried	107	125	119	118	106	122
Boiled and dried	117	122	121	116	99	100
Smoked	7	8	8	11	9	8
'Fushi'	76	74	77	72	84	79
Salted	89	91	82	116	117	141
Sundries	148	159	153	150	149	153
Oils and fats	38	42	50	30	27	40
Feed and baits	244	278	322	300	375	373

(2) Smoked Fish

The production of smoked fish shows no marked fluctuations in these days. The chief reason for such deadlock in demand is the high price caused by the inefficiency of processing methods. But it is highly valued as a regional special product.

(3) 'Fushi'

This is also a special fish food in Japan. Boiled fish meat is slightly smoked and then attached with special mold to increase its flavor. Skip-jack is the principal material. But with the recent increased use of chemical condiments, the demand for 'fushi' is being depressed.

(4) Salted Fish

This is also an old processing method, but it is the recent tendency that slightly salted gutted fish is used instead of thickly salted fish.

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(5) Fish Oil

The production of fish oil which was on the increase until 1962 is on the decline, because of the difficulty of obtaining the raw materials, as in the case of whale oil.

(6) Baits and Feeds

With the recent development of fish culture industry and poultry farming, an increasing tendency has occurred in the demand for baits and feeds. The production of these items increased from 244,000 tons in 1960 to 375,000 tons in 1964, largely owing to the increased use of wastes of fish processing. But since such increased production did not satisfy the demand to full extent, the feeds imported from South Africa and Peru increased from 92,000 tons to 487,000 tons in the same period.

Chapter IX

Fishermen's Cooperative Associations

Japan, except for small parts of its seashores composed of sandhills unfit for fishing operations, is surrounded with good fishing grounds, and its coasts are dotted over with fishing ports and villages in which fishermen are working diligently.

In fishing villages, cooperative associations are organized to intensify fishing operations. Most of the fishermen in Japan, except a small number of fishing companies, are members of cooperatives. In this way, the fishermen's cooperatives can be said to form the social and economic foundation of the Japanese fishing industry, and help in the acceleration of its development and prosperity.

Section 1. Organization of Fishermen's Cooperative Associations

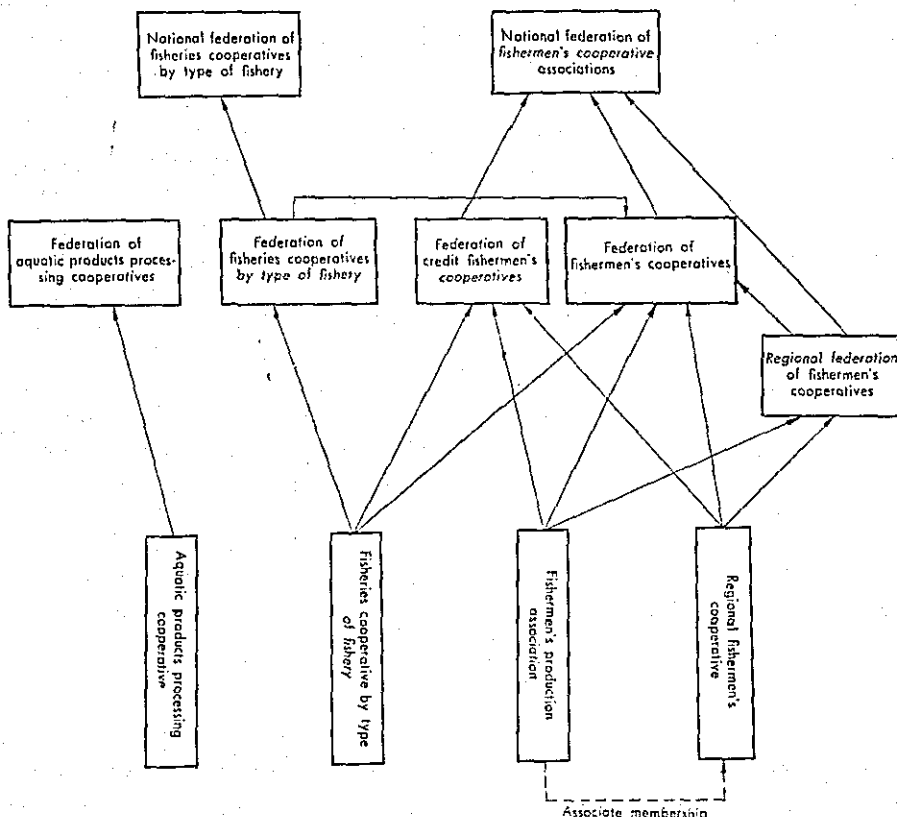
The regional fishermen's cooperative is a nucleus of cooperatives mainly organized by small coastal fishermen. The association can be established by a group of 20 fishermen or more in the area. The membership of the association is limited to fishermen. Juridical persons, who have their residences or places of business within the jurisdictional area of the association and operate fisheries by engaging 300 persons or less with fishing boats whose total tonnage does not exceed 1,000 tons, are qualified for associate membership. Such special regulations have been adopted to protect small coastal fishermen from the economic pressure of large fishery enterprises.

Fishermen's cooperatives, subject to the approval of their membership, may have their own fishing boats and operate fisheries. In case where the approval of the majority of membership is not available, or their unstable fishing operations are feared as affecting the benefits of the majority of fishermen in the area, the self-management of fisheries by cooperatives is not desirable.

The Fishermen's Production Association is an association established by interested fishermen of smaller number than that of the former, for the purpose of accelerating the unification of management and the enlargement of the scope of business. This association can be organized by a group of 7 fishermen or more, and is treated favorably in the line of financing, taxation, granting fishery rights and licenses, etc. But from the point that it is an organization of fishermen, special regulations are placed upon the qualification for membership, right of voting, dividend,

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Fig. 22 Organization of Fishermens Cooperatives



etc., and arrest the inducement of investments from outside.

On the prefectural levels, there are Federations of Fishermen's Cooperatives. In the regions which face the same bay and have similar economic circumstances, a federation of regional fishermen's cooperatives may be organized among the cooperatives.

Among the economic functions of regional fishermen's cooperatives, the credit business, which handles the receipt of savings and advance of loans, is controlled by the Federation of Credit Fishermen's Cooperatives instead of the Federation of Fishermen's Cooperatives.

As the upper grade federation of these two types, we have the National Federation of Fishermen's Cooperative Associations, which not only takes charge of the guidance and promotion of business of the federations under its jurisdiction, but in the status of a national organization of fishermen at large, it also reflects their opinions in the administrative and legislative organs.

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There are also the Fisheries Cooperatives by types of fishery which are organized by boat owners and fishery operators who share economic interests with each other regardless of the area or the region. While regional cooperatives are organized mostly by small fishermen and carry on the management of fisheries in local fishing grounds, the members of cooperatives by types of fishery are larger enterprises, and their main purpose is to secure financing facilities; and most of enterprises join regional cooperatives. Cooperatives by types of fishery also join the Federations of Fishermen's Cooperatives and the Credit Fishermen's Cooperatives, and they organize federations of their own cooperatives.

All of these cooperatives are regulated by the Fisheries Cooperative Association Law, which also includes the regulations for the Aquatic Products Processing Cooperative Association. The organization and activity of the processors' cooperatives, however, cannot be said to be very strong, compared with the fishermen's cooperatives.

According to the statistics for the past 8 years, a considerable decrease is seen in the number of fishermen's cooperatives, especially in the number of regional fishermen's cooperatives (Table 47). Under the

Table 47. Change in the Number of Fishermen's Cooperatives

	1956	1960	1964
Total	4,592	4,559	4,038
Regional fishermen's cooperatives	4,116	4,033	3,579
Fishermen's cooperatives by types of business	260	298	281
Fisheries processing cooperatives	216	228	178
Fisheries production association	816	883	829
Federations of fishermen's cooperatives	138	138	135

coastal fisheries structure improvement program, in 1961 a National Policy was adopted for the modernization of coastal fisheries with financial funds, especially for the purpose of promoting the business of regional fishermen's cooperatives. As a result of the integration of cooperatives of small types with those of large types undertaken by the policy, the number of cooperatives has been reduced year by year. The Fisheries Agency has also given active assistance along the lines of the national policy, and it is now making arrangements to submit to the Diet a "Law for Fishermen's Cooperatives Consolidation".

Section 2. History of Fishermen's Cooperatives

The reason why the Japanese fishermen's cooperatives have a high rate of organization and are making active efforts to accomplish their purposes can be attributed to their long history in the past.

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In advanced foreign countries, cooperative associations are generally organized by small producers to protect their profits and gains, but in Japan the circumstances are a little different from those in other countries. In the feudal times, Japan had many fishermen using limited fishing grounds, and there were always disputes among them in and out of their communities. Feudal lords in those days granted fishery rights to village communities, and encouraged them to regulate the utilization of fishing grounds and the management of fisheries by themselves. The bosses of village communities, on the other hand, held meetings and talked over who would operate such and such fisheries, where and how they would operate fisheries.

Through the Meiji Restoration in 1868, Japan shifted from the feudal age to the modern age. But in connection with the fishing industry, the newly introduced idea of freedom of business aggravated the disputes over fishing grounds. In order to cope with the aggravated disputes, the government enacted the "Working Rules for Fishermen's Associations" in 1884, by which the fisheries management so far operated by 'village communities' was transferred to fisheries associations. When a new "Fisheries Law" was enacted in 1901, the Working Rules was integrated into the new law.

Under this law, fishermen's cooperatives came to own fishery rights, the exercise of which was granted to their members; and unless coastal fishermen joined a fishermen's cooperative, they were not qualified to engage in fishing. By the revision of the Fisheries Law in 1910, fishermen's cooperatives came to be able to carry on economic business, but the principal function was the management of fisheries, and not economic business. According to the statistics in 1912 the number of fishermen's cooperatives which carried on economic business did not amount to 400 among a total of 3,484 cooperatives.

Such state of affairs continued until about 1930, but the world-wide economic depression following World War I sent Japanese fishermen to the very depths of poverty. The fishermen in those days, with scanty capital of their own, became indebted to merchants and were exploited by them. The government, for the purpose of improving the welfare of fishermen, undertake to furnish them with a large amount of funds with which the debts of fishermen could be shifted to fishermen's cooperatives. Then the cooperatives received the catches of fishermen and merchants joined the marketing of catches in the status of jobbers. Thus, the direct contact between fishermen and merchants being cut off in the marketing of fish catches, fishermen could become the master of fishing villages in place of merchants. The nationally controlled economics during World War II gave the finishing touches to such policies. Even after the removal of national controls in 1947, the advantages to fishermen were ensured.

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On behalf of member fishermen, fishermen's cooperatives carry on auction and tender of their catches, receiving an appropriate commission. This commission supplies the cooperatives with their financial foundation, and with the stabilized financial foundation, cooperatives have come to expand their activities to carry on credit and economic business.

The high rate of development of Japanese economy after 1955 has brought forth considerable differences in the incomes between fishermen and workers of other industries. As a countermeasure, the government is now making efforts to fully equip fishermen's cooperatives with joint facilities, as an item of the Coastal Fisheries Structure Improvement Program.

Thus, the initial object of fishermen's cooperatives was the enforcement of the fishery regulations, and with the improvement of social conditions ever since, the object has been diversified and has come to include various economic activities.

Section 3. Activities of Fishermen's Cooperatives

1. Fishery Regulations

Fishery rights are divided into 3 types: fixed-net fishery right, demarcated fishery right (mainly, culture fisheries) and common fishery right (mainly, coastal boat fisheries). Except for fixed-net fishery rights and part of the demarcated fishery rights, no persons other than fishermen's cooperatives are qualified as rightful owners, and even in case of the fixed nets and the demarcated fisheries, the priority of grant is strictly regulated by law and the priority order of individual persons is very low. Pearl culture fishery which requires much capital stock and special skill is the only fishery where individual persons and cooperatives are granted equal priorities. In this aspect of the industry, too, recent years have witnessed the emergence of fishermen's cooperatives.

Though the importance of coastal fisheries has declined with the advance of the Japanese fishing industry from coastal waters to offshore and pelagic waters, cooperatives are playing an important role in the management of coastal water fisheries, as fishery right owners.

According to the Census in 1963, the relative importance of catch in coastal fishing grounds of 971 sections among the 1,289 sections in the whole country exceeded 80%, showing the great importance of coastal fishing grounds. Such tendency is especially remarkable in the fishing village sections (Table 48).

With regard to the fishery rights owned by cooperatives, the cooperatives should make internal rules for exercising them relating to such matters as determination of qualified persons, size and number of fishing boats to be used, use of fishing gears, fishing season and methods, marine

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Table 48. Relative Importance of Coastal Fishing Grounds (1963)

No. of sections	Total	~10%	10~50%	50~80%	80%~
Total	1,289	95	130	93	971
Fishing port sections	241	61	51	24	105
Fishing village sections	1,048	34	79	69	866

- Note:
1. % shows the percentage of the catch in coastal fishing grounds in the catch of from the respective section.
 2. For the purpose of the fishery census, the coasts of the whole country are classified into two sections: fishing port section and fishing village section; and there are 1,707 sections over the country.
 3. When the fish culture sections, most of which depend on the coastal fishing grounds, are excluded from the 1,707 sections, the actual number of the total sections will be 1,289.

preservation, etc. As to many of the small fixed-net fishery and culture fishery, the users of these fishery rights are generally determined year after year by rotation or by lot.

Disputes on fishing grounds within their jurisdiction are settled by the cooperatives, and those in wider areas are settled by joint-conferences of the cooperatives in the areas concerned. The cooperatives have deep interest in the conservation of fishery resources and fish culture in the regions, in the status of right-owners and managers of the fisheries. Taking over the old propagation method of fish initiated by their forefathers 150 years ago and by making fish nests by submerging worn-out boats or rocks at the sea bed, the cooperatives have tried to build improved fish apartment houses.

There are now a number of cooperatives which are engaged in the fishing ground improvements and construction work with the aid of national subsidies, and there are also some eager cooperatives that have undertaken investment for the culture industry at their own expenses.

2. Self-management of Fisheries by Cooperatives

Fishermen's cooperatives not only grant their members the use of fishery rights, but also they may operate fisheries by themselves, through the fishery rights or fishery licenses newly granted by the State or prefectural governments, subject to the stabilized earnings of the fishery. The latter cases, however, do not amount to many in number, because of the fear of exciting competition with the fisheries operated by members. In 1965, the number of cooperatives carrying on fisheries themselves was 530 out of the 3,600 regional cooperatives in total.

The self-management of fisheries is conducted by cooperatives in the following cases:

- (a) As in the case of large fixed-net fisheries, when the management exerts a great influence on the use of fishing grounds by small fishermen,

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and individual management fears the rise of disputes among them ;

(b) As in the case of salmon-fisheries which are profitable and have many applicants, when it is difficult to select persons appropriate for the purpose because of the restriction on the number of boats to be operated from the point of protection of fishery resources ;

(c) As in the case of fish culture industry, when joint culture of roes and fries is more profitable than individual management ;

(d) As in the case of fish landing by vessels of members, when it is made in regions other than theirs and the landing commission is not imposable and their economic foundation is weakened.

3. Credit Business

Regional fishermen's cooperatives carry on the business of receiving savings and giving loans on behalf of their members, and as their upper organizations, they have credit federations. With regard to the receipts of individual fishermen from fish markets after the commission is deducted, they are paid into their own accounts automatically. Fishermen were in the habit of drawing their money from the savings but after the recent campaign made to encourage savings by the National Federation of Fishermen's Cooperatives, and with the increased incomes of fishermen owing to the advance in fish prices, the amount of their savings has been doubled in these few years. It is now customary with fishermen, like general workers in cities, to fix their necessary living expenses before hand and to draw that amount from the savings deposited in their cooperatives, and so the surplus money is being saved. As to the loans to fishermen, they have also increased in amount, and have been used for construction of their fishing boats or new houses. But the growing rate of savings has overcome that of loans, and the credit business has been stabilized (Table 49).

Regarding cooperatives by the type of industry, because of the large scale of the management of their members, they require a large amount

Table 49. Activities of Regional Fishermen's Cooperatives

	1960	1963
Scale of cooperatives		
No. of members (persons)	236	233
No. of clerks (")	6.1	6.7
Economical activities (\$ 1,000)		
Savings received	31.4	72.7
Loan to members	37.0	61.3
Sales business	181.2	278.8
Purchase business	19.8	27.9
Ice manufacture	11.3	13.8
Freezing and cold storage	24.3	10.1

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of funds which cannot be readily furnished by their savings. For example, the savings per cooperative in 1963 were only 157,000 dollars while their loans were 760,000 dollars, thus exceeding the total of savings. When the required funds of cooperatives cannot be furnished by their savings, they are provided from a bank called the Central Cooperative Bank for Agriculture and Forestry.

This bank is a special deposit bank in which savings of farmers and fishermen are deposited on favorable conditions. But because of the small structure of Japanese agriculture and the small demand of funds by farmers, the bank can make more funds available for the fishing industry. However, the loaning of surplus funds to industries other than agriculture, forestry and fisheries is strictly regulated by law.

Because fishery products can be sold in a short time at the market, the need of revolving funds for fishing industry is comparatively small. Besides a long term loaning is made available by the Central Cooperative Bank and the Credit Fishermen's Cooperatives. Under such conditions the Japanese fishing industry can be said to be very lucky in its development. It also means that the development of Japanese fisheries is greatly indebted to farmers.

4. Economic Activities

The principal economic activity of regional cooperatives is the marketing of their landed fish catches to brokers or other buyers. Because the cooperatives are provided with their own markets, and can fix fair prices for the catches through auction or tender, there are few, if any, cases of trouble in marketing.

The recent sharp growth of the economic activities of cooperatives shows a striking progress in the economic conditions of fishermen, as well as cooperatives. There is also an increasing tendency in the number of the cooperatives provided with refrigerators and processing plants which may be used for the adjustment of fish price as well.

With the development of large-sized fishing boats, their catches have come to be landed at ports remoter than the home ports. As the result, home cooperatives and merchants have had difficulties in collecting their loaned and purchase money. As a countermeasure, the cooperatives of other localities have come to make a contract with the home cooperatives, by which the money is to be paid into the account of ship-owners of into cooperatives instead of direct payment. This system of paying is called "systematic remittance", by which smooth collection of loans and safe loaning are secured.

Because all fishermen are members of their regional cooperatives, their catches are landed at their markets or those closely connected with the cooperatives in business, and since the remittance is made to the home cooperatives through systematic remittance, they have nothing to

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worry about the collection of loans. At the same time general banks can make safe loaning to fishermen because they are able to obtain detailed information on their financial status. In this way, the marketing activity of cooperatives not only protects fishermen from the monopolistic operation of merchants but also strengthens their economic foundation and stabilizes their credit business. So it must be highly valued as a motive power for fishery development.

The cooperatives also carry on purchasing business. They purchase in bulk fuel oils, nets, ship engines and daily necessities of membership and resell these things to their members. But the volume of the business does not amount much because this transaction is apt to threaten the vested interests of existing dealers and the bulk purchase by a local cooperative does not always bring down the price. And if cooperatives boldly venture to carry on their purchasing business, local merchants will try a price-cut campaign to attract cooperative members to their stores. Under such situations, the cooperatives carry on the transaction to such an extent as to check the excessive profiteering of merchants.

With regard to the purchasing of fuel oils, the National Federation of Fishermen's Cooperatives entered into a special contract with the Soviet Union eight years ago for the import of heavy oil of weak sulphur which is superior in quality and cheap in price, compared with the oils sold by common merchants. This transaction is going on favorably even now between the two parties. In 1965, 400,000 tons of oil, occupying 20% of the total consumption for fisheries, was imported from the Soviet Union.

In addition to the variegated activities mentioned above, cooperatives are playing an important part in the education of fishermen as well as in the information work.

Fisheries administration is carried on in the following manner:—

Fisheries Agency → Fisheries Sections of prefectural governments →

Fisheries Sections of cities, towns and villages → Cooperatives

For instance, as the field of technical guidance in fisheries, the national subsidies for the education of fishermen, formed by the Fisheries Agency, are allotted to cooperatives through such a route. Thereupon, the cooperatives will hold training courses or undertake study tours for the sake of their members. As for regional cooperatives, it is also an important matter for them to convey on behalf of members their opinions and intentions to the authorities of prefecture, city, town and village. There are many cases where important matters of fishery administration are submitted to the conference of the presidents of cooperatives for inquiry. The cooperatives are the electorate of selection of members of the Councils of Fishing Ports, Fishing Grounds Adjustment, Fisheries Finance and Fishing Boat Insurance.

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As domestic activities of cooperatives, again, they settle or mediate disputes or quarrels among their members, supply funds for the education of fishermen's children and operate mutual aid systems relating to their members' sickness and others. They also help their members to find additional employment.

It was a common idea that the production by fisheries is greatly restricted by natural conditions, and the life of fishermen is unstable and wasteful compared with that of farmers, but now there are not a few cooperatives that have put "monthly pay system" in operation, and are making an orientation toward the modernization and rationalization of the life of fishing families.

Chapter X

Fishery Finance

Section 1. Fishery Finance Structure

Fishery finance structure can be roughly divided into the following two types:

One is the finance system by which the national fund is financed to medium scale fishery managements* and coastal fishermen by the Agriculture, Forestry and Fisheries Finance Corporation based on the Agriculture, Forestry and Fisheries Corporation Law. The other is the co-operative finance system, which connects the Federation of Credit Fishermen's Cooperatives with the Central Cooperative Bank of Agriculture and Forestry by making fishermen's cooperatives by area or by type.

The Central Cooperative bank of Agriculture and Forestry conducts its business, under the Law for Central Cooperative Bank of Agriculture and Forestry. The Federation of Credit Fishermen's Cooperatives and Fishermen's Cooperatives carry on their respective credit business in accordance with the Fisheries Cooperative Association Law.

Besides the purpose of furnishing medium fishery management or coastal fishermen with their necessary funds, there is the Fisheries Credit Fund enacted in accordance with the Medium Fisheries Finance Guarantee Law. This Credit Fund aims to guarantee the advance of funds for which government reinsures when commercial banks finance fishermen. At present there are 39 fisheries credit fund associations established in prefectures, each conducting credit business. There is no special credit system for large fisheries companies.

1. Agriculture, Forestry and Fishery Government Fund*

In 1952, the government established the Agriculture, Forestry and Fishery Finance Corporation with a fund of 28 million dollars. This fund is to be loaned out to the following facilities related to fisheries:

- a. Fishing port basic equipments:- fishing port basic equipment, transportation equipments, general repairing and construction works of the land required for equipments and natural disaster restoration

* Medium scale fishery managements are those which operate fishing vessels of 1,000 tons or less and always employ 300 or less workers.

* The funds of Agri. For. & Fishery Finance Cooperation were increased to 361 million dollars in 1965 by the governmental funds.

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works. Fishermen's cooperatives and their prefectural federations are qualified to obtain such loan.

- b. Fishing port functional equipments:— preservation facilities of fishing boats and gears, and their supply, fish catch disposal equipments and communication equipments. The loan is to be made to the same organizations as stated above in the preceding paragraph a.
- c. Common-use equipments:— common-use facilities for ice-making refrigeration storage, fishing vessels, culture in shallow seas, etc. by fishermen's cooperative associations, etc.
- d. Fishing vessels:— The object of the advanced funds is for individual persons and cooperatives, but when the total tonnage of fishing vessels operated by them exceeds 1,000 tons, they cannot be the object of advanced fund, (in a special case, up to 1,500 tons). With regard to the agri. for. & fisheries government funds for fisheries, they were formerly given priority over the advance funds for the facilities such as fishing ports, cooperative common use equipments, etc. But in recent years, the importance of these funds has increased for the building of fishing vessels and for coastal fisheries structure improvement works. They are also used for culture facilities, processing facilities, distribution facilities, etc. Governmental subsidies constitute only part of the business expenses, except for special cases, whereby fishermen must shoulder the burden of subsequent expenses. When they are short of their own share of the burdens, this fund can be financed. As for fishing vessels, 80% of the construction fund can be loaned out to them because governmental subsidies are not granted. Its interest rates are under 8% per annum. Especially in the case of financing this fund, based on structure improvement work, the loan interest rate is as low as 3.5%, and every year an increased fund is demanded. The loan of the fisheries fund for 1966 amounted to 37 million dollars.

Table 50. Loan to Fisheries with Agri. For. & Fisheries Funds

	(Unit: U.S. 1,000 dollar)	
	1965	1966
Total	35,000	37,083
Coastal fisheries structure improvement	9,695	9,944
Coastal fisheries management stabilization	555	555
Fisheries productivity basis enforcement	1,139	1,306
Fishing vessel construction, and reconstruction	19,445	20,833
Common use facilities	3,333	3,333
Others	833	1,112

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2. Cooperative Finance

Almost all fishermen except for large fishing companies are members of fishermen's cooperatives by area and or type under the Fisheries Co-operative Association Law, and take advantage of the credit business carried on by the cooperatives. In prefectures there are Federations of Credit Fishermen's Cooperatives, which conduct credit business with fishermen's cooperatives by area and type. Besides, there is the Central Cooperative aBnk of Agri. Forestry as an upper financial institution.

With regard to the balance of savings and loans in these financing organizations for 3 years from 1962 to 1965, the total amount of loan was 604 million dollars at the end of the 1965 fiscal year and exceeded the savings of 376 million dollars, thus registering an excess loan.

Table 51. Changes of Savings and Loan (end of March) of Cooperative Financing Organizations

	(Unit: million dollars)			
	1962	1963	1964	1965
Savings (A)				
Central co-op. bank of A. F.	35	43	46	56
Federation of credit fisheries co-op.	74	105	127	162
Fisheries cooperatives	79	106	148	158
Total	188	254	321	376
Loan (B)				
Central co-op. bank of A. F.	144	188	218	258
Federation of credit fisheries	62	76	99	125
Fisheries cooperatives	137	163	189	221
Total	343	427	506	604
(A)-(B)				
Central co-op. bank of A. F.	*109	*145	*172	*202
Federation of credit fisheries co-op.	12	29	28	37
Fisheries cooperatives	* 58	* 57	* 41	* 63
Total	*155	*173	*185	*228

It is the Central Co-op. Bank of Agri. Forestry that played a leading part in the excess loan. The main part of the saving of this Bank is from organizations related to agriculture, but the proportion of loan to the agricultural organizations is relatively low, compared with those of fisheries. As a result, the fund has become somewhat surplus for these years, and it has met the demand of fisheries to the full. So it may be said that the increased fund of the Central Co-op. Bank of A.F. has brought about the development of fisheries cooperative finance in recent years.

The Central Co-op. Bank of A.F. was established with the national fund before World War II, but it is now a bank operated with nongovernmental funds such as those of farmers and fishermen, and it is different

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from general banks in being able to issue public loan bonds to collect its fund.

3. Local Fisheries Finance System

Out of the 46 prefectures all over the country, 36 prefectures have their own fisheries finance systems. Nearly all the prefectural finances are intended to expedite the development of coastal fisheries and to supplement governmental subsidies and finance.

When fishermen borrow funds from lending institutions like the Federation of Credit Fishermen's Co-op., many prefectures subsidise the interest to the institution.

Loans are granted for:- (a) the modernization of equipments, (b) the improvement of fishermen's management, (c) the improvement of co-operatives' management, (d) the relief for poor catch and natural disaster, (e) the promotion of distribution and processing, (f) the practical application of medium and small coastal fisheries finance guarantee system.

It is mainly from 1960 and after, that the local finance system was brought into operation, and with the progress of the national coastal fisheries structure policy it has been enlarged. Formerly the governmental financial aid to coastal fisheries was insufficient, but in recent years both central and local finance systems have come to be operated actively.

Section 2. Present Situation of Fishery Finance

1. Contribution of Fishery Finance

In recent years the fishing grounds have extended to distant waters and accordingly the size of fishing vessels has been enlarged and the equipments of vessels and fishing gear have been improved.

For example, with regard to the number and tonnage of powered fishing craft, 137,000 vessels and 984,000 tons in 1954 increased to 203,000 vessels and 2,024,000 tons respectively in 1964, showing an increase of 48% in number and an increase of 105% in tonnage in ten years.

Such improvement in fishing vessels and equipments has brought forth the enlargement of the scale of fishery management, and the increased amount of invested capital. The average amount of assets of medium managements which was 71.3 thousand dollars in 1962 went up to 99.4 thousand dollars in 1964 showing around 14% increase. With regard to the amount of debts in the assets, 43.6 thousand dollars in 1962 jumped up to 66.5 thousand dollars in 1964 increasing by 15% (Table 52).

Trying to increase the capital, fishermen are mostly inclined to borrowing rather than the use of their own money. This is partly because

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Table 52. Composition of Assets of Medium Fishery Managements per Unit

	Gross total	Assets composition	
		Debts	Self-owned capital
1962	71,353\$	43,636\$	27,717\$
1963	87,364	55,953	31,411
1964	99,439	66,481	32,958

their own capital is small and partly because they have come to be able to rely upon the loan schemes from the fishery financial organizations by the recent establishment of fishery financial system.

2. Scale of Fishery Management and Financial Funds

Fishery finances vary according to the scales of fishery management. The fishing companies capitalized with over 100 million dollars are largely financed by commercial banks and partly by the Japan Development Bank and the Japan Export-Import Bank. The medium fishing industries of a higher class depend largely on loans from commercial banks, and the members of fishermen's cooperatives depend partly on the loan from the Central Co-op. Bank of A.F. and the A.F. & Fisheries Finance Co-op. The medium fishing industries of middle and low class are financed through financing organizations such as the Mutual Financing Bank and Credit Bank. But since most of them are members of fishermen's cooperatives, they largely depend upon the loan from the financing organizations connected with cooperatives such as the Central Co-op. Bank of A.F. and Federation of Credit Fishery Co-op., and at the same time the loaning from the A.F. & Fisheries Finance Co-op. has also increased.

With regard to the family fishing industry in coastal waters, the loaning from city banks has declined while personal loaning has increased. But borrowing from the co-op. financing organizations such as fishermen's cooperatives and federation of credit fisheries co-op. has rapidly increased. With the recent development of the improvement program of coastal fisheries structure, the loan scheme from the A.F. & Fisheries Co-op. has also increased.

In former years, merchant capital strongly controlled small fishing industry. Fishermen were obliged to obtain a loan from fish merchants and fishery material stores on some pretext or other. But now as the result of the substantial supply of fisheries capital, the expansion of the activities of fishermen's cooperatives, and the increased loans from financial funds of the State, the reliance upon private finance has been reduced. In case of small managements, however, there are some cases where they rely upon private finance as ever. And in case of large management, there

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are some cases where they suffer from credit purchase and overdue accounts with shipbuilding yards or material stores.

3. Increase in Advanced Funds

Table 53 shows the changes in the balances of loan made to fishing industry by financing organizations during the four years from 1962 to 1966. In these four years, the balances of loan increased from 680 million dollars to 1,207 million dollars showing an increase of 77%. As regards the balances by financing organizations, the balance of co-op. financing organizations is largest, and increased by 2.1 times, from 212 million dollars to 455 million dollars, and especially, a remarkable increase is seen in the balance by the Central Co-op. Bank of A.F.

Table 53. Changes of Advanced Funds to Fishery Management by Types of Financing Organs

	(Unit: million dollar)				
	1962	1963	1964	1965	1966
Gross total					
Total	678	831	965	1,095	1,207
Large companies	247	297	313	336	350
Medium managements	431	534	652	759	857
Banks					
Total	325	387	442	476	506
Large companies	241	291	308	331	344
Medium managements	84	96	134	145	162
Medium & small financing organizations					
Total	68	81	92	104	121
Large companies	—	—	—	—	—
Medium managements	68	81	92	104	121
Cooperative financing organizations					
Total	212	281	331	402	455
Large companies	—	—	—	—	—
Medium managements	212	281	331	402	455
National financing organizations					
Total	73	82	100	113	124
Large companies	6	6	4	5	5
Medium managements	67	76	96	108	119

Note: 1. "Large companies" means those capitalized with over 140,000 dollars.
 2. Family managements on the coast are also included in medium managements.

With regard to fishing companies and managements which are financed through financing organizations, they may be classified into two groups: large companies capitalized at over 140 thousand dollars (amounting to 45 companies in 1963) and medium managements of smaller scale

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than the former. The advanced fund of the large companies as of the end of 1965 fiscal year was 350 million dollars, occupying 29% of the total. As to the breakdown of advanced funds to the fishing industry, the advanced fund from banks such as commercial banks, credit banks, the Longterm Credit Bank and National Credit Bank was 506 million dollars, of which 344 million dollars were financed to the large companies, occupying 68% of the total. On the other hand, no advance of funds is made for the large companies by medium financing organizations such as mutual financing banks and credit banks, and the advance of funds for medium managements is made entirely by such co-op. financing organizations as the Central Co-op. Bank of A.F., federation of credit fisheries co-op., fishermen's cooperatives, etc. As to the advance of funds made for medium managements through the national financing organizations, it is made almost entirely by the Agriculture, Forestry and Fishery Finance Corporation. Besides, the advance of funds amounting to 5 million dollars is made for large companies by the Japan Export & Import Bank and Japan Development Bank.

4. Use of Advanced Funds

The use of advanced funds by large companies and medium managements and by financing organizations is as follows:

The amount of advanced funds used for equipment fund as of end of 1965 fiscal year was 504 million dollars occupying 42% of the total, and that used for working fund was 703 million dollars, 58% of the total. The percentage of the equipment fund advanced to the large companies was 38% while that advanced to medium managements was 43%, showing that the latter depend upon the loaned money more largely than the former for the purpose of improving their equipment.

The total amount of advanced funds from common financing organizations such as banks and medium financing organizations was 627 million dollars, of which 186 million dollars (29%) were used as equipment fund. Of this equipment fund, 130 million dollars went to the large companies and 56 million dollars went to medium managements, showing that the latter depend upon borrowed finance more largely than the former to obtain their working funds.

The cooperative financing organizations advanced to medium managements (membership of cooperatives) 194 million dollars as equipment fund and 260 million dollars as working fund. This amount of equipment fund occupies 53% of the total equipment funds of these managements.

With regard to the advanced funds from the national financing organizations, they are largely used as equipment fund. Out of 5.3 million dollars for the large managements, 5 million dollars and almost all the advanced funds for medium managements amounting to 119 million dollars were advanced as equipment fund.

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From these data it can be concluded as follows:

Large companies raise most of their equipment and working funds through common financing organizations, while medium managements depend upon cooperative financing organizations and national financing organizations to raise their equipment fund, and depend upon general financing organizations of medium type and cooperative financing organizations such as federation of credit fisheries cooperatives, and fishermen's cooperatives, to raise their working funds. The recent increase in the advanced funds from cooperative financing organizations and national financing organizations is playing an important role in the promotion of improved equipment of medium managements.

Section 3. Problems involved in Fishery Finance

1. Increase in Interest-bearing

The investment in fisheries has greatly increased year after year by the expansion of fishing grounds, reconstruction of fishing vessels and modernization of fishing facilities, but in case of medium managements, since the investment depends largely on loans, their owned capital has begun to show a sign of decrease. The average rate of their owned capital which was 37% in 1962 gradually fell down to 36% in 1963, and to 33% in 1964.

With the decline in the rate of their owned capital, the charge of interest for their debts grew large, and reduced their business profits (Table 54). Especially in recent years, despite of the increased efforts in operation, the production has become stagnant, and the increase in profit-rate has become hopeless, and the payment of loans and bearing of interest have become a big pressure upon their management.

Table 54. Changes of Income and Profit of Medium Managements
(average per management)

	Fishery income	Net profit	Net profit rate of total capital
1962	8,200	2,878	4.0%
1963	9,669	4,108	4.7
1964	9,708	2,453	2.5

Note: Net profit = income - (interest + managers' returns + taxes).

Fishing industry is said to be comparatively little affected by general economic fluctuations, and as to the financial aids for the industry, even when general finance is tightened, it is not affected greatly because of the

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high rate of advanced funds from the governmental and cooperative financing organizations. Under such situations, some fishery managements have come to entertain an easy-going management view. As a countermeasure, therefore, some of the overloaned managements will be obliged to make efforts to fill up their owned capital.

2. Finance for Coastal Fisheries

According to the statistics, those who are under strong pressure of interest-bearing, belong mainly to the leading medium managements. As to the coastal fisheries largely operated by family labor, though their advanced funds from cooperative and governmental financing organizations have increased, they are still dependent upon the loans from other private financing sources.

Regarding the loans of medium managements as of the end of 1964 fiscal year, the percentage of the loans from private financing sources was 14%, but that of the managements with powered boats of 3-10 ton class was 19% and that of those with powered boats of less than 3 tons was 42%.

Coastal fishery managements, on the whole, rarely make use of loans from commercial banks, but they generally make use of the advanced funds of fishermen's cooperatives, of which they are members. If they belong to cooperatives which enjoy good financial conditions and are operating their business smoothly, it is all right. But if they belong to cooperatives whose business is depressed, they will not be able to be furnished with their necessary funds, and be obliged to borrow their funds from their relatives, acquaintances, fish stores, material merchants or others.

In such cases, usual interest is lower than that of commercial basis. However the result is the same as borrowing money at high interest because they give their catch to the relatives and acquaintances at the time of loaning or they are obliged to sell the catch or to buy materials from the lenders.

With regard to the loaning of governmental funds, it must be applied for through the cooperative concerned, and if the applicant belongs to any depressed cooperative he will be excluded from the list of qualified persons.

Even if any local financing organization is established by the present system, for the purpose of carrying on smooth financing for coastal fisheries, it is necessary to firmly establish the organization of fishermen's cooperatives and to develop their business. To this end, it is required to expedite the affiliation and combination of the present fishermen's cooperatives.

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3. Increased Demand for Working Funds

The present state of advanced funds for the working funds of large companies from city banks is almost satisfactory. But as for the working funds of medium managements and coastal fisheries, they are not financed by the Agri., For. and Fisheries Finance Corporation because the Corporation advances only long-term funds such as equipment funds and others. The recent increase in fishery production has brought forth the longer period of fishing operation and the increased wages of employees which greatly require working funds. Under such situations, medium fishery managements and coastal fishermen have made a strong request to cooperative financing organizations for the supply of working funds. But since there is no difference in the rate of interest for the working funds between cooperative financing organizations and general financing organizations under the existing condition, it is very necessary that the low interest loaning of working funds be made by cooperative financing organizations for the medium and coastal managements in weak financial conditions.

Chapter XI

Fishery Education

1. History of Fishery Education

Japan has a long history of fisheries, but before the Meiji era (1868-1912) no large-scale fisheries other than fixed net fishing, drag net fishing and coastal whaling were operated. Other fisheries were all of small type, and their catches were exclusively used for the local consumption. It was from the latter part of the Meiji era that the fisheries production began to take a strong rising tendency. The principal causes of such increased production were due to the increased consumption of aquatic products, exploitation of new fishing grounds and improvement of fishery techniques and facilities. As a root cause, however, we can not overlook the spread of fisheries education which was encouraged by the government and private enterprises.

For the purpose of promoting technical development of fisheries and carrying out various researches on fishery industries, it is absolutely necessary to seek the assistance and guidance of fishery technical experts. In view of the necessity for cultivating such men of talent, the Japanese Government undertook the establishment of an educational system for fisheries as one of its policies in fisheries in the middle of the Meiji era. It is very interesting to compare the growth of fisheries production with the development of fishery education.

In 1888, the Suisan Denshujo (Fisheries Institute) was established as a private school. The term of education was 4 years, and those who finished the compulsory education of 6 years and the secondary education of 5 years were admitted. The jurisdiction of this school was transferred to the Ministry of Agriculture and Commerce in 1898 and the quality of education was improved. The name of school was changed to the Suisan Koshujo (Imperial Fisheries Institute). In 1909, the Faculty of Fisheries was provided for in the Sapporo College of Agriculture, Hokkaido, and then it was developed into the Hakodate Fisheries College. In 1910, the Department of Fisheries was established also in the Tokyo University. The graduates of these schools were sent out not only to the front of industrial revolution in those days but also to the administration organizations which were in great need of fisheries specialists, and they rendered great services in their respective fields.

With regard to the fishery education in prefectures, Fukui Prefecture took the initiative in the establishment of a fishery school at Obama in 1895, and other prefectures followed this example by and by. The

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course of study of these schools was 5 years and those who finished the compulsory education were admitted. Now the number of prefectural fishery schools has reached 55.

After World War II these schools as well as those established later were consolidated into universities and fishery senior or junior high schools of a new system. Now the fifteen universities which have fishery courses send out about 1,000 graduates every year and fifty-five fishery high schools, more than 6,000 graduates.

2. Fishery Education in Universities

There are fifteen universities in Japan which give technical education relating to fisheries. Eleven of them are national institutions, one is prefectural and three are private institutions.

The course of study in universities extends over four years, of which the first two years are allotted to general culture and the other two years to technical education relating to fisheries, aquiculture, fish processing and engineering.

Graduates of these universities find employment in fishery companies, government offices and other businesses, and some of them pursue the postgraduate course.

The following table shows the names of universities, their locations, institutions, departments and number of students.

Table 55. Universities and Departments

Location	Name	Institution	Department (Faculties)	No. of students
Minato-cho, Hakodate City	Hokkaido Univ.	National	Fisheries Department Fishery Products Technology Faculty Aquiculture " Pelagic Fisheries " Teachers' Training Course	680
Kita-Rokuban- cho, Sendai City	Tohoku Univ.	National	Fisheries Faculty	120
Mukogaoka, Bunkyo-ku, Tokyo	Tokyo Univ.	National	"	120
Shiba Kaigan- dori, Minato-ku, Tokyo	Tokyo Univ. of Fisheries	National	Fisheries Department Fisheries Faculty Fishery Products Technology Faculty Aquiculture " Teachers' Training Course	910
Nagahama, Maizuru City	Kyoto Univ.	National	Fisheries Faculty	90
Daimon-cho, Fukuyama City	Hiroshima Univ.	National	Fisheries Faculty	120

(Next on continued)

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Location	Name	Institution	Department (Faculties)	No. of students
Hakozaki, Fukuoka City	Kyushu Univ.	National	Fisheries Faculty	40
Ohashi-machi, Nagasaki City	Nagasaki Univ.	National	Fisheries Department Fisheries Faculty Fishery Products Technology Faculty Aquiculture "	310
Funatsuka-machi, Miyazaki City	Miyazaki Univ.	National	Fisheries Faculty	80
Shimoarata-machi, Kagoshima City	Kagoshima Univ.	National	Fisheries Department Fisheries Faculty Fishery Products Technology Faculty Aquiculture Faculty Fisheries Management Fac. Teachers' Training Course	470
Oya-machi, Tsu City	Mie Pref. Univ.	Prefectural	Fisheries Department Fisheries Faculty Aquiculture " Fisheries Products Technology Faculty	180
Shimouma, Setagaya-ku, Tokyo	Nihon Univ.	Private	Fisheries Faculty	320
Kowakae, Fuse City Osaka-fu	Kinki Univ.	Private	Fisheries Faculty	160
Yoyogi Tomigaya, Shibuya-Tokyo	Tokai Univ.	Private	Oceanography Department	390
Yoshimi Nagata Hon-machi, Shimonoseki City	Shimonoseki Univ. of Fisheries	National	Fisheries Faculty Fishery Products Technology Faculty Aquiculture " Engineering "	800

3. Fishery Education in Senior High Schools

Fishery education in senior high schools is conducted in their regular and postgraduate courses. The term of regular course is 3 years and that of postgraduate course is 2 years.

In the regular course, students of 16 to 18 years old, for the purpose of becoming fisheries technical experts in the future, learn techniques of fishing, fish processing, engineering, fish culture and radio communication. In the postgraduate course, students are trained not only for acquiring higher techniques, but also for obtaining senior navigation officer's licenses attending Fisheries and Engineering Courses, or ship radio operator's licenses of 1st or 2nd class attending Radio Communication Course.

All of the fisheries senior high schools now amounting to 55 in num-

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ber were established and are being managed by local public entities. Seventeen schools of them are of collective type and give courses in fisheries, engineering and radio communication, while other 38 schools are of single type and give only one course. With regard to the 52 schools having postgraduate course, 29 of them offer fisheries, 17 offer engineering and 6 offer radio communication.

The present number of students taking the regular course is 19,794, of which 747 being girls, and that of those taking the postgraduate course is 751. Graduates from regular course—60% of them are employed in businesses related to fisheries, 30% in other businesses, 5% engaged in independent businesses and 5% entered schools of higher grade. Graduates from postgraduate course—50% of them are working in fishing boats and other 50% in merchant ships.

4. Fishermen's Cooperative Association Schools

In Chapter 8 we have already referred to the important role of the fisheries cooperatives in the fisheries of Japan. For the purpose of training the staff of cooperatives, we have the following special schools:

- (a) All-Japan Fishermen's Cooperative Association School;
- (b) Fishermen's Cooperative Association Training Centre;
- (c) Cooperative Association Technical School.

Trainees in these schools are as a rule personnels who work in fishermen's cooperatives and have completed the compulsory education. The All-Japan Fishermen's Cooperative Association School is a school attached to the National Federation of Fisheries Cooperative Associations and the other two schools (b & c) are establishments of the Hokkaido and Nagasaki Prefectural Governments respectively.

The All-Japan Fishermen's Cooperative Association School which was established in Tokyo in 1941 has the oldest history among the rest. The term of education is one year and fifty students are admitted every year. They are selected among the applicants from fishermen's cooperatives and are trained and housed in a dormitory. The graduates from this school are now the backbone in the activities of fishermen's cooperatives. The Fishermen's Cooperative Association Training Center was established after World War II in Hokkaido where the people take a special interest in fishermen's cooperatives. The students undergo one year training in a dormitory free of charge and part of their cost of living is also borne by the prefectural government. The Nagasaki Cooperative Association School is a combined training institution for fisheries and agriculture and is of small scale compared with the former two schools.

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5. Training Boats and Research Boats

Universities, fisheries senior high schools, the State and prefectural governments are provided with fisheries training and research boats. The total number of these boats over 50 tons is in the neighborhood of 100. The largest boat among them is the Umitaka Maru of the Fisheries University of Tokyo, its tonnage being 2,500 Ts. The Fisheries Agency and the Oceanography Laboratory of Tokyo University have also built oceanographic research boats of 3,000 ton class. (Table 56).

Table 56. Fishery Training Boats (1965)

	Total	50~100tons	100~500tons	500~tons
Universities	12	1	4	7
Fisheries senior high	49	19	30	
State and Prefectures	36	12	19	5
Total	97	32	53	12

The research boats and training boats belonging to the State are operated exclusively for the purpose of researching in fishing grounds and oceanography, while those of fisheries senior high schools, universities and prefectural governments are operated not only for the purpose of training of students and research of fishing grounds, but also for the purpose of fishing and making profits.

Section 2. Training of Fishermen

1. On-the spot Training

Since the enforcement of the Promotion Law for Pelagic Fisheries in 1898, the Japanese Government has directed its efforts to the improvement of technicians who work on board fishing boats through on-the-spot training with promotional subsidies.

In the first stage, the technical training was conducted exclusively for those fishery technicians, captains and chief engineers who were going on board pelagic fishing boats. But later, the coverage of training was gradually expanded and began to include radio operators and technicians who work on board off-shore and coastal fishing boats.

From 1958, as a part of the improvement and extension program of fishing industry and for the purpose of encouraging the organization of fisheries improvement and research bodies which promote fishermen's voluntary research activities, governmental subsidies came to be given for their study meetings and inspection tours to advanced places.

In 1959, the above-mentioned two activities were consolidated into a project for promoting the practical activities of the young generation

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in fishing villages, and by which the on-the-spot training of fishermen has come to be well-organized.

Keeping abreast with the latest high development of fishery techniques and rapid growth of national economy, the education of fishermen has gained in importance more than ever. In 1965, younger generation classes for the purpose of cultivating successors and employment turnover, consulting service has been established, and at the same time as a means of training young fishermen, substantial courses on different subjects have come to be taught on selective system.

The principal means of training includes conferences for cultivating the new generation in fishing villages, consultations for guidance, traveling advice offices, presentation meetings of operation results, fishery techniques training meetings (production and management techniques for group consultants), younger generation classes, introduction of techniques of advanced places (visits to advanced places and tests of introduced techniques), training meetings of fishing boat techniques (operation techniques, special operation techniques, medical services) and radio techniques training meetings.

Of these means, radio techniques training is conducted by the National Fishery Radio Association, while others are conducted by prefectural governments with national subsidies.

2. Permanent Training Centers

There is no permanent training center established by the government, but the Aomori Prefecture is conducting a fishermen's training center with the course of study covering one year.

For the purpose of encouraging the establishment of permanent training centers in prefectures, the government began to furnish three prefectures with promotional subsidies from 1962. The training of this educational institution is conducted mainly through younger generation classes and by various types of training meetings and lecture meetings which enlighten and develop the knowledge and techniques of fishermen.

By the end of 1965, eleven more places will have such institution, and in due course of time thirty-one other places will also be operating their respective training centers.

The government, which is now developing the culture industry of important reproductive species of fish in Seto Inland Sea, has entrusted the Seto Inland Sea Fish Farming Association with the training work of culture techniques at five establishments of its culture center with promotional subsidies.

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3. Improvement and Extension Work

For the purpose of extending fishery techniques and improving fishery management of fishermen, prefectural governments have provided specialists and extension officers. The Central Government furnishes subsidies for the personnel expenses and office expenses at the rate of 50% of the total.

The specialists, now 105 persons in total, are divided in two groups fish propagation group and fishery mechanical group. They are generally attached to prefectural fisheries experimental stations. They conduct researches on their specialities, and at the same time they undertake guiding and assisting work on the services of extension officers. As occasion demands, they give direct guidance to fishermen.

For the purpose of extension service, the whole country is divided into 478 areas, each of which has about 500 fishery households. One extension officer is stationed in each area, and he takes charge of giving a direct guidance to fishermen making the rounds in his designated area. This system was instituted in 1959 with 48 extension officers, and their number being increased every year, their stationing in the whole areas was completed in 1965.

On the improvement of living conditions of fishermen's households, under the provisions of the Promotion Law for Agriculture Improvement of 1960, home-life improvement extension officers have come to be stationed in fishing villages and the number of these officers reached 105 in 1965.

These technical and extension officers undergo a special training under the sponsorship of the government. The training for technical officers is held in Tokyo dividing them into two groups, fish propagation group and fishery machinery group, while extension officers are trained in the local institutions dividing the whole country into 6 blocks. Their training course includes lectures, discussions and object lessons covering one week.

The newly appointed extension officers, technical officers and home-life improvement extension officers undergo a special training course covering 10 days in Tokyo once a year.

For those extension officers who have been in service for some time a long re-training course covering 3 months has come to be offered since 1964, and they receive such training in Fisheries Research Laboratories, Prefectural Fisheries Experimental Stations, Universities or other Government institutions, the course of which includes lectures, discussions and specific lessons.

The expenses of these trainings are borne by the Government, and the travelling expenses of trainees are partly paid through governmental subsidy.

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Table 57. List of Training Establishments for Fishermen

Training establishments	Organizers	Term and Frequency
Education works for young people in fishing villages		
(1) Training meetings in fisheries techniques Training of group leaders Training in fisheries management Training in production techniques	Fisheries Section of Prefectural Government	2~4 days; several times in a year
(2) Fishing village young fishermen's classes	Fisheries Section of Prefectural Government	7~28 days; several times
(3) Training courses in fishing boat techniques Training in boat operation techniques Training in special boat operation techniques Training of health officers Training of stewards	Fisheries Section of Prefectural Government	7~60 days; several times
(4) Training course in fishery radio telegraphy	All-Japan Fisheries Radio Association	150 days; one time
Education works related to Fisheries Cooperatives		
(1) Training in fisheries cooperatives and credit cooperatives	Prefectural Federations of Fishermen's Cooperatives and Credit Cooperatives	Various types
(2) Short courses for presidents of prefectural federations of fisheries cooperatives	National Federation of Fishermen's Cooperatives	3~4 days; one time
(3) Short courses for officers and staff on the management of cooperatives	National Fishermen's Cooperative School	1~2 weeks; one time
Training meetings of ship's wright	Fishing Boat Section Fisheries Agency	30~40 days
Training meetings of divers	Labor Standard Bureau	3 days; 3~4 times in a year
Training meetings of refrigerators	High-pressure Gass Security Association	3~4 days; 5 times
Fish farming training	Seto Inland Sea Fish Farming Association	Within 7 days; several times; in 3 places
Frozen fish cooking lecture meeting	Frozen Fish Association; Prefecture Governments; Better Home Association	1 day in various places
Fishing boat medical examiner's lecture	Central Association for Fishing Boat Insurance	2 days; one time

Chapter XII

Fisheries Administration

Section 1. Structure of Fisheries Administration and Researches and Budgets

1. Structure of Fisheries Administration and Researches

The Fisheries Agency is one of the agencies of the Ministry of Agriculture and Forestry and has the Director's Secretariat General Affairs Section, four divisions and thirteen sections. (Fig. 23)

The Director's Secretariat General Affairs Section is responsible for the business relating to personnel affairs, financial affairs, budget, publicity, adjustment and others relating to fisheries.

(1) Fisheries Administration Division

This division consists of six sections;—Planning, Cooperative Association, Fisheries Adjustment, Fisheries Promotion, Fishery Product Distribution, and Fishing Boat Insurance Sections.

Planning Section takes charge of the business relating to planning of the fisheries administration in general for the purpose of improvement of fisheries. Since 1964, under the Promotion Law for Coastal Fisheries etc., this section has come to present the Fisheries White Paper to the Diet every year.

Cooperative Association Section takes charge not only of the business relating to cooperatives, but also of the business relating to fishery finance and fishery accident compensation. The fishery accident compensation system in Japan is a unique mutual aid system to compensate for any damage which fishermen may suffer from fluctuations in fish catch.

Fisheries Adjustment Section takes charge of the business relating to the fishery right and license of coastal and offshore fisheries and the adjustment of disputes between fishermen.

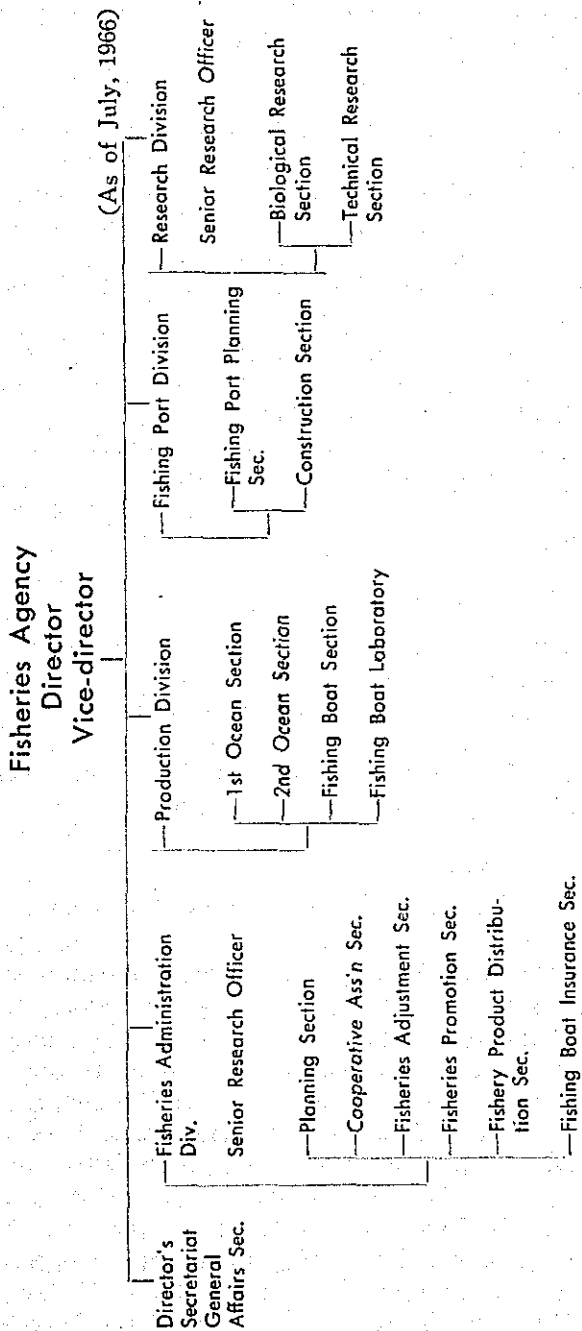
Fisheries Promotion Section takes charge of the business relating to the promotion of coastal and inland water fisheries, laying emphasis on the structure improvement of coastal fisheries.

Fisheries Product Distribution Section takes charge of the business relating to the distribution and processing of fishery products. Owing to the recent rise in consumer's price and the increase in import goods, a rapidly increasing tendency is seen the volume of business.

Fishing Boat Insurance Section takes charge of the business relating to the insurance of fishing boats. The fishing boat insurance system in

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Fig. 23



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Japan was instituted in 1937, but since the establishment of the system of compulsory application for insurance in 1952, it has come to run upon the true line of operation.

(2) Production Division

This division consists of four sections;—First Ocean, Second Ocean and Fishing Boat Sections, and of Fishing Boat Laboratory.

First Ocean Section takes charge of the business relating to the international fishery conventions and adjustments, license of whaling and North Pacific salmon and crab fisheries, etc.

Second Ocean Section takes charge of the business relating to the overseas fishing operation of private fishing operators, license of tuna fishery, trawl fishing in the East China Sea and the Yellow Sea, and trawl fishery in the waters off Africa and other countries.

Fishing Boat Section takes charge of the business relating to the registration of fishing boats, inspection of the performance and safety of fishing boats, monitoring of radio wave, etc.

Fishing Boat Laboratory conducts researches on fishing boats and attached facilities.

(3) Fishing Port Division

This division consists of two sections; — Fishing Port Planning Section and Construction Section.

Fishing Port Planning Section takes charge of the business relating to the arrangement plan of fishing ports.

Construction Section takes charge of the business relating to fishing port construction, improvement and guidance.

(4) Research Division

This division consists of two sections; — Biological Research and Technical Research Sections.

Biological Research Section takes charge of the business relating to the personnel affairs and budgets of the eight National Fisheries Research Laboratories and Pearl Research Laboratory and the orientation of research subject-matters. The Section also prepares reports on the status of fishery resources at the request of the administration.

The Japanese coastal areas are divided into 6 regions, in each of which one regional fisheries research laboratory is established besides the Freshwater Regional Fisheries Research Laboratory and the Deep-Sea Fisheries Research Laboratory. These laboratories not only make scientific researches on fishery subjects in their respective regions, but they make fishery researches in broader scale. Under the auspices of the Research Division, the regular meeting of the Directors of Research Laboratories is held every year, at which the subject matters of research

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are fixed by the mutual coordination and adjustment.

The Research Laboratories have several divisions in them, such as Oceanography, Fishery Resources, Fishing Gear & Fishing Method, Processing and Fish Culture Divisions, and some of them have no divisions such as Fishing Gear & Fishing Method, Processing or Fish Culture Division. The Laboratory in Tokyo has Mathematical Statistics Division in addition.

In the scientific study on fisheries in the past, the importance was attached to the studies on the fishery stocks, the relation between fishing effort and fish catch and the establishment of proper fishery management. But in the recent years, in addition to the studies mentioned above, the mechanization of fishing gear and method to meet the shortage in labor power, the highly effective utilization of fishery products for the increased demand of fish protein and the improvement of fish culture techniques accompanied by the development of fish culture have become the mainstay of studies to be made in these laboratories.

Technical Research Section takes charge of the business relating to the supervision of specialists and extension officers stationed in the coasts of Japan, and at the same time it makes a close contact with the prefectural fisheries experimental stations and guides them in fishery researches. Most recently the business relating to the roes and fries distributive center has come under the control of this Section.

All the staff members of the Fisheries Agency amount to 1,820 persons, of which 720 persons are attached to the eight laboratories and are engaged in the research administration.

Section 2. Direction of Fisheries Policy

1. Budgets of Fisheries Agency

The general and special accounts in the 1966 budget of the Fisheries Agency were 67.1 million dollars and 24.1 million dollars respectively. In addition, the expenses for building the living quarters and schools in fishing villages, enforcement of preventive measures against water pollution, etc. were appropriated in the special budgets of several Ministries concerned (Table 58).

Compared with the budget for 1956 in which the general account amounted to 19.5 million dollars, the budget for 1966 shows an increase of about 3.5 times in the ten years. Seeing that in these ten years the general account in the national budget increased from 3,000 million dollars to 12,000 million dollars, an increase of 4 times, the relative importance of the budget of the Fisheries Agency can be said to have dropped to some extent.

The appropriation for the equipment of fishery production means,

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Table 58. Budgets of Fisheries Agency

(Unit: 1,000 dollars)

	1965	1966
Total	55,942	67,136
Consolidation of foundation of fishery production	28,748	34,739
Modernization of coastal, medium and small fisheries	8,619	9,087
Conservation and culture of fishery resources	1,260	1,342
Researches and culture of fishery resources	2,708	3,176
Distribution and processing of fishery products	614	974
International fisheries counter-plan	1,011	1,605
Others	12,982	16,213
Total	17,576	24,132
Special account for fishing boat insurance	14,160	20,227
Special account for medium and small fisheries financing guarantee insurance	3,416	3,905

especially that of fishing ports occupies the most important part in the budget.

2. Arrangement of Production Facilities

(1) Equipment of Fishing Ports

The number of fishing ports designated under the Fishing Port Law in 1966 amounted to 2,772. Since the end of World War II the equipment of fishing ports has been hastened on a 7-year program, and now the 3rd term program (1963-70) is in progress (Table 59).

Table 59. Fishing Port Construction Plans

	Period	Expenses (mil. \$)	No. of ports	No. of ports completed	Remarks
1st plan	1951~1954	151	450	43	
2nd plan	1955~1962	153	604	243	
3rd plan	1963~1970	278	380		Now in building

The construction of fishing ports is a very expensive work, and it takes a long time to recover the investment, and it is impossible for small fishermen to repay it by their own capacity. Under such situations, the government treats the fishing port construction as a public work and furnishes a large sum of subsidy. The sum of national subsidy varies according to the characters of ports from the total expenses of construction to 40% of the total. In the latter case, the rest of the expenses are generally borne by prefectures, cities, towns or villages concerned. But there are some cases where cities, towns or villages which are weak in financing capacity ask for contribution from the fishermen's cooperative associations in the region. In such cases, the fishermen's cooperatives

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generally obtain a long-term loan at low interest from the Agriculture, Forestry and Fisheries Finance Corporation.

The budget for equipment of fishing ports in 1966 was 31.6 million dollars and occupied about 50% of the general budget of the Fisheries Agency. It was about 1930 when a positive investment began to be made on fishing ports. In those days owing to the world-wide depression in business, the unemployment problem came to assume a grave aspect even among fishermen. As a means of relief works, the government undertook the construction of fishing ports in coastal areas. With the development of fisheries and with the enlargement of fishing boats in size and function as well as the increased frequency of utilization of fishing ports after World War II, the establishment of a new plan for construction of ports is being studied. The main points of providing fishing ports in the past were the construction of breakwaters and fish landing piers. But the important works now involved in the complete equipment of fishing ports are the road repairing in and around fishing villages, construction of processing plants and cold-stores and reclamation of foreshores for the purpose of improving the attached facilities of the port.

Fishing ports are not only bases of fishing operation but also they are centers of distribution and processing of fish catch. Since the facilities of fishing ports directly regulate the development of fisheries, it is proper that the budget for their facilitation occupies a large portion of the total amount of the budget of the Fisheries Agency.

Fishing boats in Japan not only use the fishing ports regulated by the Fishing Port Law, but they also use the general ports regulated by the Harbor Law. Most of large fishing ports belong to the general ports. The budget for fishing ports under the Harbor Law is made by the Ministry of Transportation which administers the facilities of ports in general use.

(2) Construction of Fish Shelters (Fish Apartments of Large Type)

With regard to the construction expenses of concrete block fish shelters, 60% of the expenses is subsidized by the State while the rest is borne equally by prefectural governments and fishermen concerned. This construction work was inaugurated in 1960 and 714,000 blocks have been thrown in the sea to construct the fish shelters until now.

(3) Development Plan of Shallow Sea

The value of shallow sea for culture grounds will be improved by the enlargement of mouths of inlets, and by the construction of drainages or digging ditches at the seabottom, and new culture grounds will be constructed by building breakwaters and groins in the offing. For the purpose of carrying out the development plan of culture grounds in the shallow sea not later than 1973 in 20 places suitable for such improvement and construction, an investigation is being undertaken.

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3. Modernization of Coastal and Offshore Fisheries

(1) Structural Improvement of Coastal Fisheries

Japanese economy reached a highly growing stage in 1955 when the annual rate of the national total production substantially showed over 10%. At the same time, the incomes of city workers increased, and the difference in incomes with workers of the primary industry became great. The government, which recognized that the low income of farmers and fishermen was caused by their small scale management, began to enforce the development policy of coastal fishery structure through the enlargement of management scale and the modernization of fisheries. As a result of such policy-making, the Promotion Law for Coastal Fisheries and Others was established in 1963.

Under this Law, with government subsidies, fishermen's cooperatives and other fishermen's organizations have come to be able to have their fishery guidance boats, radio stations, repair shops of boats and gears, refrigerators, and processing plants, and at the same time they have constructed or improved their fishing grounds and culture facilities. About 30 to 50% of the expenses of these works have been subsidized by the State. In planning these works, after the original plans have been mapped out by the fishermen's cooperatives, cities, towns and villages concerned, they are submitted to the prefectural governments concerned for examination and then to the Minister of Agriculture & Forestry for approval.

In the national budget for 1966, 4.3 million dollars was appropriated for this purpose. When the amount of expenses allotted to the fishermen cannot be borne by them for some time, such amount is financed by the Agriculture, Forestry and Fisheries Finance Corporation by long-term and low-interest loan.

The subsidies of the State are granted only for common facilities, but not for personal properties such as fishing boats. When coastal fishermen undertake to build new vessels or larger vessels according to the program for structural improvement work, they can borrow money redeemable in 15 years and at annual interest of 3.5 per cent from the Agriculture, Forestry and Fishery Finance Corporation.

Since the fishery structural improvement work which was started on a ten-year program will end in 1971, new programs are now being studied by the government under the New Economic Program along the following lines:

- (a) Promotion of culture in shallow seas by taking up the stocking or planting of fish as the principal theme;
- (b) Concentration of scattered coastal fishing centers to comparatively large fishing ports;

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(c) Introduction of modern equipments and effective joint management.

The idea of these programs is based upon the prospect of the future when the priority in the coastal fisheries will be oriented from fisheries by boats to culture fishery.

(2) Promotion of Inland Water Fisheries

The relative importance of inland water fisheries in Japan is low compared with other countries because of its geographical conditions. But in connection with fish culture in inland waters, since it is technically easier than the culture in the sea, an increasing tendency is seen in these years in its production. For the purpose of promoting this type of culture, the Fisheries Agency has undertaken almost the same project with the structural improvement work in coastal fisheries, with the budgets of 117,000 dollars in 1965 and 165,000 dollars in 1966.

(3) Fisheries Accident Compensation System

This is the system which was established for the purpose of stabilizing the management of fisheries by making reasonable compensation for accidents which may occur by the decline in fish migration and by the decrease in fishery earnings of fishermen due to other causes. Compensation fund has been created by the government and fishermen for the cases which come under the provisions of the rules. Compensation money is granted within the limit of 70% of the difference between 70% of the average earnings for the previous three years and the actual earnings of that year.

The tentative enforcement of this system was made around 1960, and it has become to be enforced on a full scale since 1964. For 1966, the Fisheries Agency appropriated 1.8 million dollars in the budget. With the establishment of the reinsurance system in 1967, the loss which may occur in the fund will be borne by the State.

The fisheries damage compensation system not being a compulsory system as the fishing boat insurance, there is a tendency among prosperous fisheries operators that they do not like to become members, which naturally raises the rate of installment to be paid by the members as well as that of the share to be borne by the State. None the less, the expectation entertained by fishermen for this system is very great.

(4) Fishing Boat Insurance System

As already mentioned, the history of this system is old and well stabilized. Since this system did a very good business and its cumulative profits reached 4 million dollars. Such amount was returned to the fishermen in 1965 and at the same time the insurance due was rated down. According to the results of business in 1965, the number of insured boats amounted to 136,000, and the paid-up premium was 10 million dollars,

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while the amount of paid-back insurance money to 37,000 insured boats was about 9 million dollars.

4. Distribution and Processing of Fishery Products

The promotional subsidy for the distribution and processing of fishery products in 1966 was 974,000 dollars, showing about 60% increase over the previous year when it reached 614,000 dollars. The purpose of such subsidies is to carry on the cold-storage work in consuming centers for the fish catches which are brought in large quantities according to season and area, and to ship them on a well-laid plan in the poor fishing season so that the stabilized price and high utilization of fish catches may be maintained. This business is carried out by the National Federation of Fishermen's Cooperative Associations. Together with this work, subsidies are granted not only for the installation of cold-storages and freezing cars in fishing centers, but also for advertising the use of frozen fish so that the system of cold chain may be established in the future. With regard to the equipment of fish markets in producing centers, the subsidy is partly granted within the scope of subsidies for the structure improvement program and construction works of fishing ports, while the subsidy for fish markets and retail stores in consuming centers is granted by the Agricultural Economy Bureau of the Ministry of Agriculture and Forestry. No special importance has been attached to the promotion of fishery processing industry and the present appropriation of budget for this industry is still very limited.

5. Development of New Fishing Grounds and Biological Researches in International Fishing Grounds

Owing to the increased demand for fishery products and to no marked increase in fish catches, the unbalanced condition between the supply and demand is increased. In order to cope with such situations the development work of new fishing grounds is being hurried up. The construction work of fishery research vessels of 3,000 tons class started in 1965 will be completed in 1967. In the budget for 1966, 1.2 million dollars were appropriated for this work. In the New Economic Program of the government, it is urged that the State should make a positive investment for the development of new fishing grounds so that the supply and demand of fishery products may be well balanced.

Besides, in view of the situation where Japanese high-sea fisheries are being operated largely under the international fisheries conventions, biological researches are being made on salmon, crab, tuna and bottom fishes etc. in international scale.

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6. Conservation and Management of Fishery Resources

A careless exploitation is apt to destroy fishery resources. Especially, competitive operation in fishing grounds is the cause of disputes among fishermen. Since Japan has many fishermen from old days, it has an accumulated experience of these disputes in coastal waters. Under such situations, it is a very important problem in the fishery management to determine how fishery rights and licenses should be exercised and how adjustment should be made in the disputes or conflicting interests of fishermen.

In the total budget of the Fisheries Agency, the budget for fishing ports occupies a large proportion, while from the point of view of the number of personnels and the amount of service of the Agency, the business relating to fishery rights and licenses holds a high position. The expenses for this business are included in "Others" of the Budget of Fisheries Agency in Table 58.

The budget of the Fisheries Agency for 1965 and 1966 also include the expenses for prevention of water pollution, administration of protected waters, management of stocking and cultivating fisheries centers, stocking of salmon, development of culture grounds at seabottom, etc., though not large in amount compared with that for fishing ports.

7. Fisheries Experiments and Researches, and Extension Works

The Fisheries Agency has ten research laboratories including eight National Fisheries Research Laboratories and the Pearl Research Laboratory and the Fishing Boat Laboratory. The 1966 budget for these laboratories including the personnel, equipment and research expenses amounted to 2.5 million dollars. Even though the figures appear to amount very high, when closely examined, it can hardly be said that such amount is enough to pay the expenses of so many laboratories and and the researchers and laboratory workers amounting to 720 in number.

The subjects of fishery researches cover various fields which require not only the participation of laboratory workers but also the cooperation of many fishing operators and prefectural fisheries experimental stations. In order to secure the cooperation of prefectures in the researches, some amounts of subsidy are granted by the State and joint research works are adopted.

One of the remarkable joint researches is the forecasting service of sea and fishery conditions which commenced in 1965 through the cooperation of fishing boat owners. Sea and fishery conditions as well as the movements of fish schools are reported every day to the Forecasting Center in Tokyo from fishing vessels operating at sea and at the same time the movements of fish schools are explored by airplanes from the sky. Based on these data the Forecasting Center prepares the Diagram

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of Sea and Fishery Conditions every day, which will be relayed to the fishing vessels by the telephotograph. The vessels, then with a facsimili of the diagram, map out a plan of operations for the following day. Such tactics are now being in operation for the fishing of horse mackerel, mackerel and sardine in the western waters of the Japan Sea and in the northern and southern waters of the Pacific Ocean and for the fishing of skipjack, albacore, saury and squid in the Pacific. This ingenious operation does not only answer the purpose of increasing the efficiency of fishing but also eliminates the waste of time and labor in the face of bad conditions.

The fisheries improvement and extension work was inaugurated in 1953, and specialists and extension officers have come to be stationed at fishing villages ever since. These officers undertake the task of technical guidance and play the part of advisers in fisheries. Under the guidance of these extension officers, fishing villages have come to organize fisheries study groups. As of the end of 1966, about 600 extension officers reside in fishing villages all over the country, and each of them is in charge of guiding about 500 coastal fishermen and is playing an important part in the improvement work of fisheries. The budgets for this work have been expanded year by year, 322,000 dollars for 1965 being increased to 420,000 dollars in 1966. Living condition improvement extension officers, though small in number and mostly women, are stationed in fishing villages.

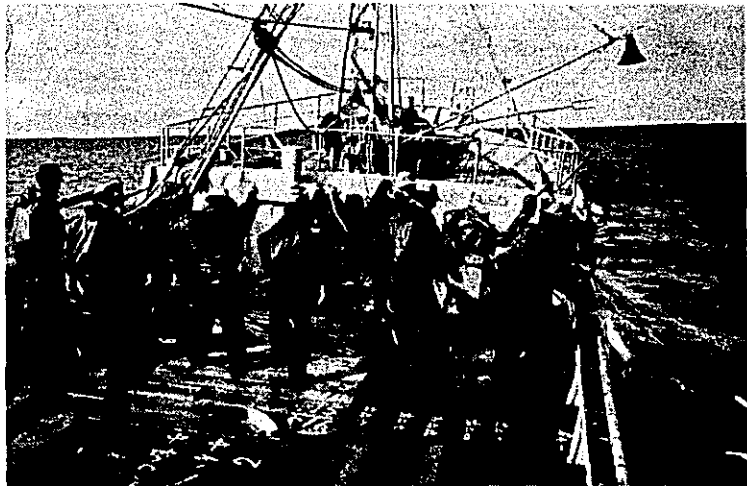
Besides, some amounts of budget and subsidy though not large in sum are defrayed for holding fisheries techniques training courses (mainly relating to engines and navigation) for young men in fishing villages. Fisheries radio techniques training courses and others are under the sponsorship of prefectural governments and so with the construction cost of the fishermen's training centers.

Most of the technicians on board large vessels are graduates from universities, but the skippers, chief engineers and telegraphers on board coastal and off-shore fishing boats are employed from technicians who have completed the training courses and have passed the State examinations. With regard to the fisherman students of training courses, some fishermen's cooperatives or ship owners bear their living and travelling expenses while they are studying fisheries techniques.

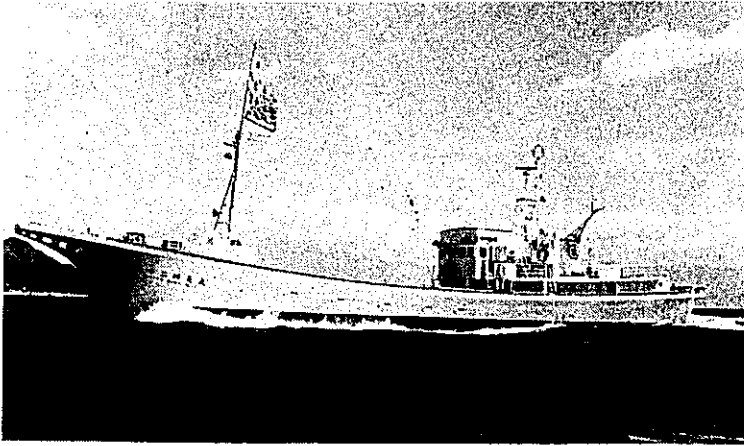
Mothership-type Salmon Fishery in the North Pacific



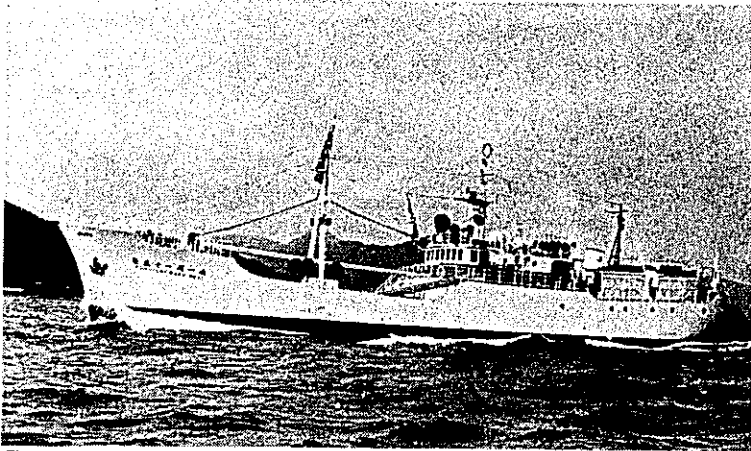
Salmon caught by catchers are being discharged in their mothership.



A catcher is taking salmon with drift-nets.



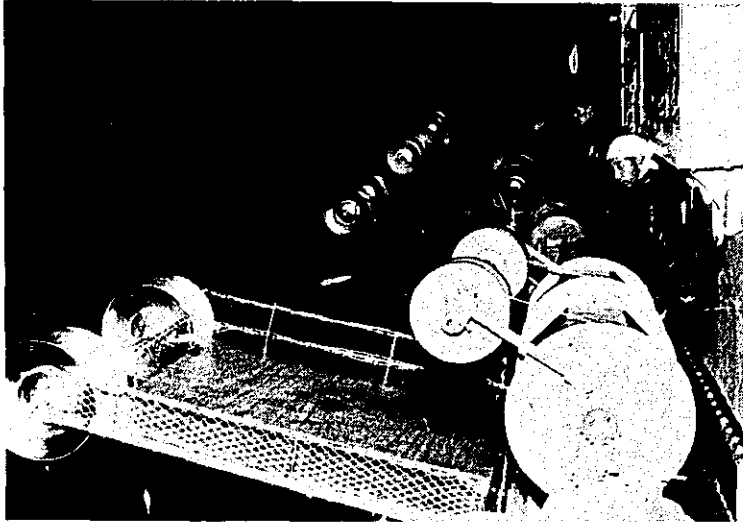
A. Fishing Vessel used for both Skipjack and Tuna Fisheries



B. Fishing Vessel used exclusively for Tuna Fishery

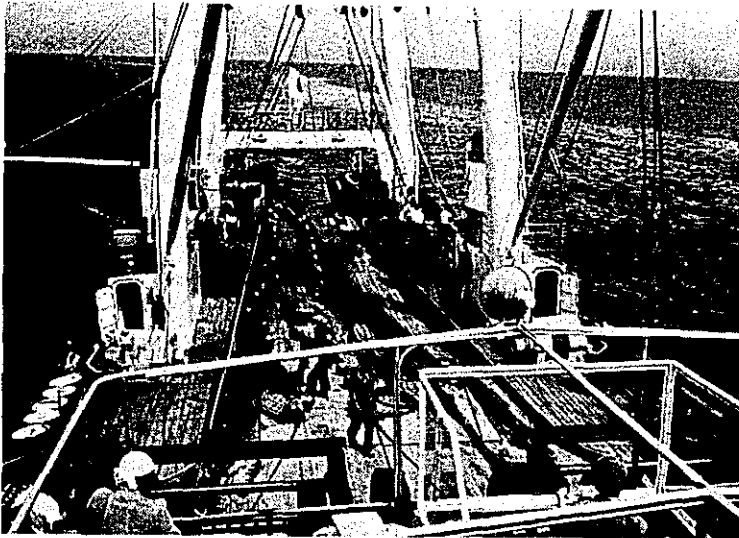
A is a fishing vessel of 200 Ts class. One of the characteristics of this vessel is that its bow is widely extended so that a number of fishermen forming in line alongside may operate skipjack pole fishing.

B is a most representative vessel of 260 Ts class which is exclusively used for tuna fishery.



Mechanization of Squid Fishing

Until 2 or 3 years ago, squids were angled with line one by one. But the recent development of fishing machinery through the use of drums has come to dispense with much man power.

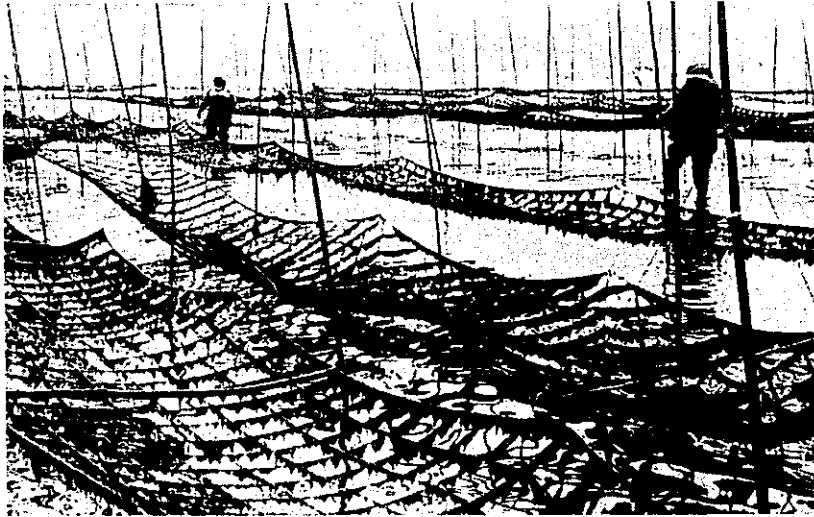


Stern-trawler of Large Type

A stern-trawler actively engaged in high-sea fisheries is preparing to set nets.

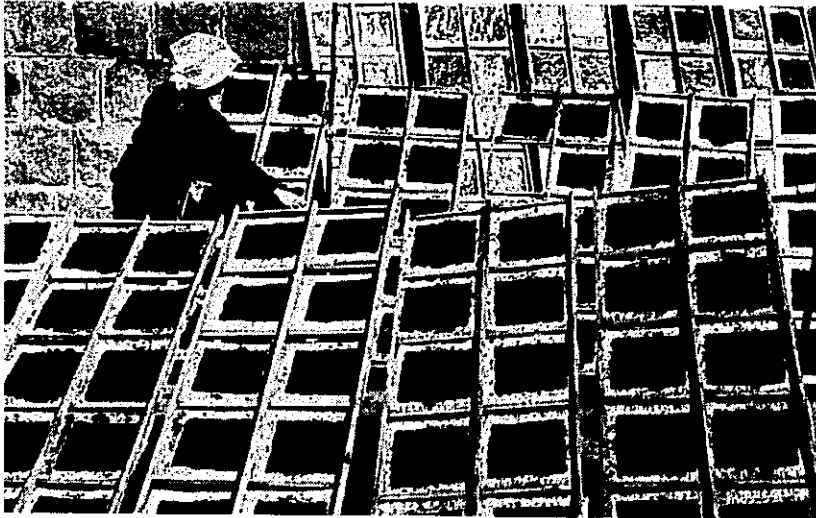
Laver "Nori" Cultivation

A.



Nylon nets of 1.5 m wide and 20 m long combined in a line are stretched out in the sea and are supported with bamboos. This photograph is a scene where laver nets have appeared above the sea level at low tide and family members of fishermen's household are examining the growth of laver.

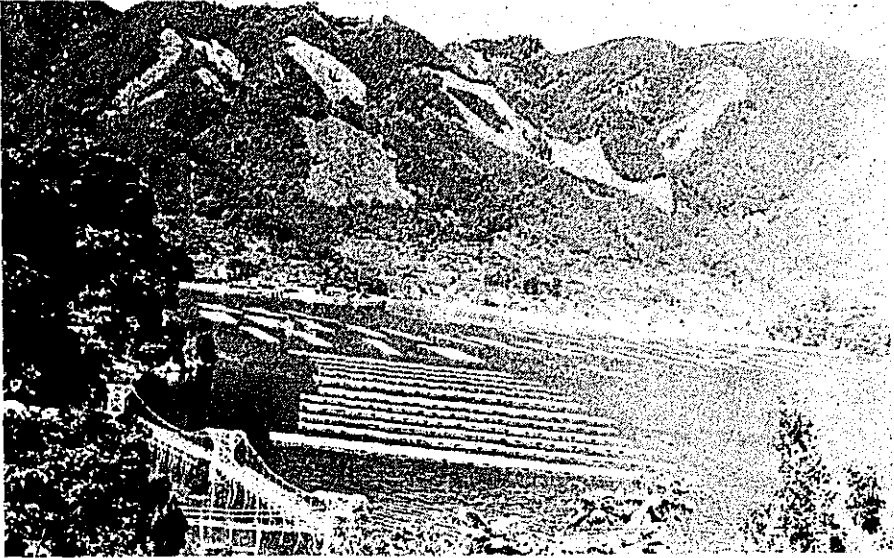
B.



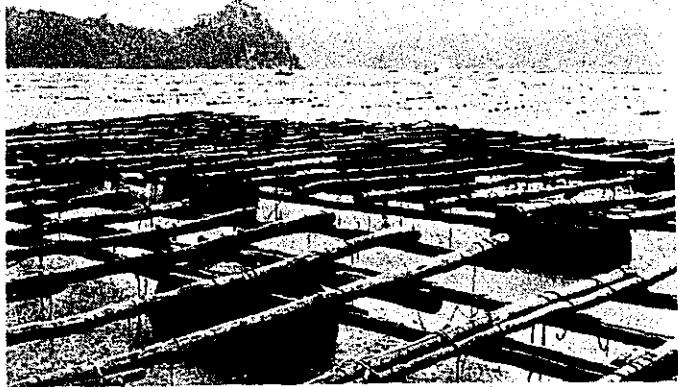
Collected laver is minced and washed in water. Then it is dried in the sun about one day as seen in photo B. The producer's price of a sheet of laver is over 5 cents.

The drying method in the sun is now being improved to a mechanical drying method indoors.

Pearl Culture (Mie Prefecture)

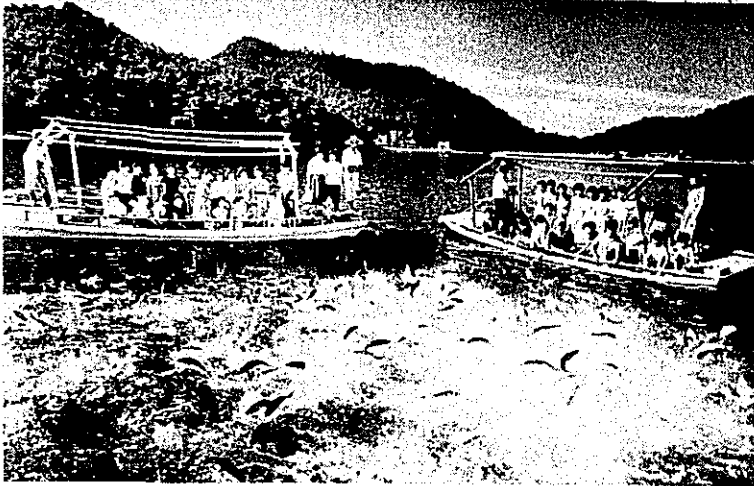


Pearl culture rafts floating in inlet viewed from the hill.

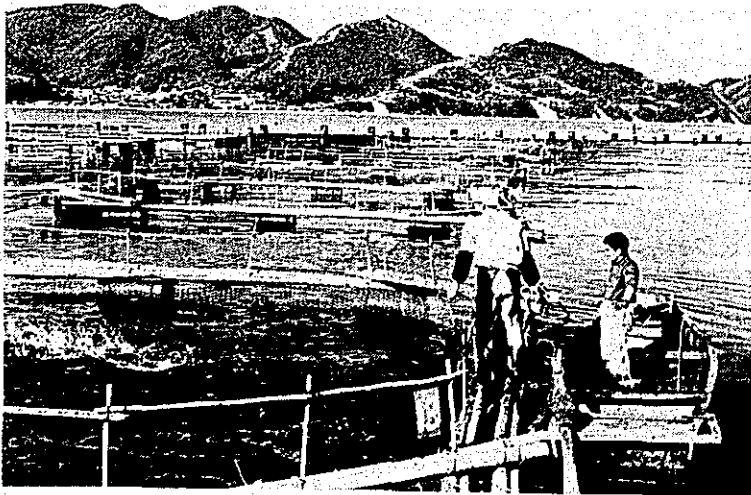


Rafts are constructed of wood or bamboo with drum cans as floats. Under the wires, there are hung culture baskets made of vinyl-coated netting which contain mother-of-pearls.

Culture Pond of Young Yellowtail ('Hamachi')



This young yellowtail culture pond was constructed by partitioning the entrances of an inlet with embankments. The picture is a scene where young yellowtails in the pond are jumping up to take baits given by the sightseers.



This is the newest method of young yellowtail culture which is conducted by demarcating the coastal areas with nets for the purpose of economizing cost and promoting efficiency. Such culture areas are all located in the Inland Sea.

List of Private Enterprises Related to Fishery

<i>Name</i>	<i>Address</i>	<i>Cable Address</i>
● Shipbuilding ●		
MITSUBISHI HEAVY INDUSTRIES, LTD.	10, 2-chome, Marunouchi, Chiyoda-ku, Tokyo, Japan	HISHIJU TOKYO
MIHO SHIPYARD CO., LTD.	3797, Miho, Shimizu, Shizuoka Pref.	SHIMIZU MIHO ZOSEN
USUKI IRON WORKS, LTD.	796 Ichihama, Usuki-city, Oita Prefecture	
NETSUNA SHIPBUILDING & ENGINEERING CO., LTD.	6-4, Tsukiji 5-chome, Chuo-ku, Tokyo, Japan	NETSUNAZOSEN TOKYO
SHIKOKU DOCKYARD CO., LTD.	597, Asahi-machi, Takamatsucity, Kagawa Pref., Japan	SHIKOKUDOCK TAKAMATSU
NARASAKI SHIPBUILDING CO., LTD.	135, Tsukiji-cho, Muroran-city, Japan	
NAGASAKI SHIPYARD, LTD.	74 Naminohiramachi, Nagasaki, Japan	NAGASAKIZOSEN NAGASAKI
YAMANISHI SHIPBUILDING & IRON WORKS, LTD.	1-4, 3-chome, Kawaguchi-cho, Ishinomaki-city, Miyagi Pref., Japan	ISHINOMAKI YAMANISHI ZOSEN
HIGASHIKYUSHU SHIPBUILDING CO., LTD.	1200, Shitanoe, Usuki, Oita Pref.	
HAMADA SHIPYARD CO., LTD.	Hikimoto-Miyamacho, Kitamuro-gun, Mie Pref.	MIE MIYAMA HAMAZO
GORIKI SHIPYARD CO., LTD.	655, Ominatocho, Ise-city, Mie Pref., Japan	
YAMAKAWA ZOSEN	Kagoshima, Japan	
HAYASHIKANE SHIPBUILDING & ENGINEERING CO., LTD.	472-1 Hikojima, Shimonoseki-city, Yamaguchi Pref.	
HITACHI ZOSEN	47, Edobori 1-chome, Nishi-ku, Osaka, Japan	SHIPYARD OSAKA
NIPPON KOKAN KABUSHIKI KAISHA	Otemachi, Chiyoda-ku, Tokyo	KOKANSHIP TOKYO
FUKUOKA SHIPBUILDING CO., LTD.	No. 3-14, 3-chome, Minato, Fukuoka, Japan	
NIGATA ENGINEERING CO., LTD.	No. 27-7, 2-chome, Taito, Taito-ku, Tokyo	NITE TOKYO
NETSUNA SHIPBUILDING & ENGINEERING CO., LTD.	No. 6-4, Tsukiji 5-chome, Chuo-ku, Tokyo	NETSUNAZOSEN TOKYO

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<i>Name</i>	<i>Address</i>	<i>Cable Address</i>
ISHIKAWAJIMA-HARIMA HEAVY INDUSTRIES CO., LTD.	New Ohtemachi Bldg., 2-chome, 4, Ohtemachi, Chiyoda-ku, Tokyo, Japan	IHICO TOKYO
● Engine ●		
AKASAKA IRON WORKS CO., LTD.	10-1-chome, Ginza-Higashi, Chuo-ku, Tokyo	AKASAKA IRON OSAKA
KUBOTA IRON & MA- CHINERY WORKS, LTD.	22, Funade-cho, 2-chome, Naniwa-ku, Osaka, Japan	IRONKUBOTA OSAKA
SUMIYOSHI ENGINEER- ING CO., LTD.	Sanritsu-bldg., Nishi Haccho- bori 3-5, Chuo-ku, Tokyo	
THE HANSHIN DIESEL WORKS, LTD.	Ichiban-cho, Nagata-ku, Kobe, Japan	HANSHIN KOBE
FUJI DIESEL CO., LTD.	Kyobashi Bldg., 2, 2-chome, Kyobashi, Chuo-ku, Tokyo,	FUJIDIESEL TOKYO
YANMAR DIESEL ENGINE CO., LTD.	62 Chaya-machi, Kita-ku, Osaka, Japan	YANMAR OSAKA
YAMAHA MOTOR CO., LTD.	1280 Nakajo Hamakita-shi, Shizuoka Pref., Japan	YAMAHAMOTOR HAMAMATSU
TOKYO HATSUDOKI CO., LTD.	11-2-chome, Kyobashi, Chuo- ku, Tokyo, Japan	TOHATSU TOKYO
DAIHATSU DIESEL MFG. CO., LTD.	1 Naka 1chome, Oyodo-cho, Oyodo-ku, Osaka	DAIHATSU OSAKA
MAKITA TEKKOSHO CO., LTD.	1-3, Fukuokacho, Takamatsu, Kagawa, Japan	
TOKYO BOAT INC.	2, 3-chome, Ginza, Chuo-ku, Tokyo	ISEDEM TOKYO
NIGATA ENGINEERING CO., LTD.	No. 27-7, 2-chome, Taito-ku, Tokyo	NITE TOKYO
RIGOSHA & CO., LTD.	2 Kajicho 1-chome, Kanda, Chiyoda-ku, Tokyo, Japan	RIGOSHA TOKYO
NIPPON HATSUDOKI CO., LTD.	No. 35, 2-chome, Kinpei-cho, Hyogo-ku, Kobe	KOBE NIPPATSU
MATSUI IRON WORKS CO., LTD.	No. 70, Takegahana-cho, Ise-city, Japan	MATSUI ISE MIE

● Machinery ●

IKEUCHI TEKKOSHO	9-9 Tamachi, 1-chome, Akashi-city, Japan	AKASHI IKEUCHI
YANAGIYA MACHINERY WORKS, LTD.	862 Kiwanami, Ube-city, Yamaguchi Pref., Japan	YANAGIYA

LIST OF PRIVATE ENTERPRISES RELATED TO FISHERY

<i>Name</i>	<i>Address</i>	<i>Cable Address</i>
BIBUN MACHINE CONSTRUCTION CO., LTD.	880, Higashi-fukatsu-cho, Fukuyama-city, Hiroshima Pref., Japan	BIKISEISAKU TOKYO
HIRAGA MANUFACTURING CO., LTD.	70 Mizukasa-dori, 2-chome, Nagata-ku, Kobe	KOBEHIRAGA
● Refrigerating Machines ●		
DAIKIN KOGYO CO., LTD.	9th floor Shin-Hankyu Bldg., 8 Umeda, Kita-ku, Osaka, Japan	DAIKINOKAY
EBARA MANUFACTURING CO., LTD.	Haneda Asahi-cho, Ota-ku, Tokyo, Japan	EBARAMAIN TOKYO
FUJI KOKI MANUFACTURING CO., LTD.	28-3-chome, Tamagawa Todoro-ki-cho, Setagaya-ku, Tokyo, Japan	SSFUJIKOKICO
DIESEL KIKI KABUSHIKI KAISHA	7-6, 2-chome, Shibuya, Shibuya-ku, Tokyo, Japan	DIIZERU TOKYO
HASEGAWA IRON WORKS, LTD.	30, 3-chome, Minami-sakagawa-cho, Minato-ku, Osaka, Japan	HASEGAWA-SURELY OSAKA
FUJI ELECTRIC CO., LTD.	1-1-chome, Marunouchi, Chiyoda-ku, Tokyo, Japan	DENKIFUJI TOKYO
HITACHI, LTD.	4, 1-chome, Otemachi, Chiyoda-ku, Tokyo, Japan	HITACHY TOKYO
KINOSHITA & CO., LTD.	17, 4-chome, Higashi-shinagawa, Shinagawa-ku, Tokyo, Japan	KINOME TOKYO
MAYEKAWA MFG. CO., LTD.	3-19, Botan-cho, Koto-ku, Tokyo, Japan	MYCOMMYK TOKYO
ISHIKAWAJIMA-HARIMA HEAVY INDUSTRIES CO., LTD.	New Ohtemachi Bldg., 4, 2-chome, Chiyoda-ku, Tokyo, Japan	IHICO TOKYO
KISHA SEIZO KAISHA, LTD.	Nippon Bldg., 8, 2-chome, Otemachi, Chiyoda-ku, Tokyo, Japan	KISHASEIZO TOKYO
MITSUBISHI ELECTRIC CORPORATION	Mitsubishi Denki Bldg., Marunouchi, Chiyoda-ku, Tokyo, Japan	MELCO TOKYO
JAPAN REFRIGERATING MACHINERY MFG. CO., LTD.	34, 1-chome, Ryuzen Taito-ku, Tokyo, Japan	
MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD.	Kadoma, Osaka, Japan	MATSUDEN MORIGUTI

JAPANESE FISHERIES

<i>Name</i>	<i>Address</i>	<i>Cable Address</i>
MITSUBISHI HEAVY INDUSTRIES, LTD.	10, 2-chome, Marunouchi, Chiyoda-ku, Tokyo, Japan	HISHIJU TOKYO
MITSUI SHIPBUILDING & ENGINEERING CO., LTD.	6, 5-chome, Tsukiji, Chuo-ku, Tokyo, Japan	MITSUIZOSEN TOKYO
NICHIDEN KOGYO CO., LTD.	1-27, 6-chome, Nakanobu, Shinagawa-ku, Tokyo, Japan	
OHNISHI NETSUGAKU KOGYO-SHO CO., LTD.	1, 1-chome, Kanda Ogawamachi, Chiyoda-ku, Tokyo Japan	
NAKANO REFRIGERATORS CO., LTD.	16, 1, 3-chome, Shibaura, Minato-ku, Tokyo, Japan	NAKAREFRIG TOKYO
NIPPON DENSO CO., LTD.	Kariya, Aichi, Japan	DENSO KARIYA
SAGINOMIYA SEISAKU-SHO, INC.	55-5, 2-chome, Wakamiya, Nakano-ku, Tokyo, Japan	SAGINOMIYA INC TOKYO
NAKASU ICE MACHINERY WORKS, LTD.	177 Haramachi, Ota-ku, Tokyo, Japan	
NITTO KOGYO CO., LTD.	Oba Bldg., 26, 4-chome, Kamidori, Shibuya-ku, Tokyo, Japan	
SANKYO ELECTRIC CO., LTD.	31-7, 1-chome, Taito, Taito-ku, Tokyo, Japan	DYNAMOWL TOKYO
SANYO ELECTRIC CO., LTD.	2-18, Keihan Hondori, Moriguchi, Osaka, Japan	SANYO OSAKA
TAKAGI REIKI CO., LTD.	37, Hinode-cho, Adachi-ku, Tokyo, Japan	
TOSHIBA MACHINE CO., LTD.	3, 4-chome, Ginza-nishi, Chuo-ku, Tokyo, Japan	TOKYOSIBACO TOKYO
SHOWA JUKI MANUFACTURING CO., LTD.	10-20, 4-chome, Minami-ohmori, Ota-ku, Tokyo, Japan	
TOYO CARRIER ENG. CO., LTD.	4, 2-chome, Nihonbashi-hongoku-cho, Chuo-ku, Tokyo, Japan	CARRIER TOKYO
TOKYO SHIBAURA ELECTRIC CO., LTD.	1-1 Uchisaiwai-cho, Chiyoda-ku, Tokyo, Japan	TOSHIBA TOKYO
TAJIRI KIKAI KOGYO CO., LTD.	6, 1-chome, Taiheicho, Sumidaku, Tokyo, Japan	KINSHIWICK TOKYO
TOYO ENGINEERING WORKS, LTD.	464 5-chome, Minami-shinagawa, Shinagawa-ku, Tokyo, Japan	TOYOSEISAKU TOKYO
VICTOR COMPANY OF JAPAN, LTD.	1-1, 4-chome, Nihonbashi-Honcho, Chuo-ku, Tokyo, Japan	VICTOR TOKYO

LIST OF PRIVATE ENTERPRISES RELATED TO FISHERY

<i>Name</i>	<i>Address</i>	<i>Cable Address</i>
TOKYO REIKI BUHIN CO.	9, No. 14, 1-chome, Taito, Taito-ku, Tokyo, Japan	
● Fishing Net ●		
TOKAI NET MFG. CO., LTD.	33, Shinzaki, Shona-cho, Okazaki, Aichi Pref..	TOKAINET OKAZAKI
MIYE SEIMO CO., LTD.	Yokkaichi (P.O. Box No. 1), Japan	SEIMO YOKKAICHI
YAMAJI FISHING NET CO., LTD.	Toyohashi P.O. Box 24, Aichi Pref., Japan	YAMAJI TOYOHASHI
AMIKAN FISHING NET MFG. CO., LTD.	Tomida P.O. Box No. 10, Yokkaichi, Mie Pref., Japan	AMIKAN YOKKAICHI
FUKUI FISHING NET CO., LTD.	34, Kagita-cho, Toyohashi-shi, Aichi Pref., Japan	FUKUI TOYOHASHI
HIRATA SPINNING COM- PANY, LTD.	17-2, 5 Amagasuka, Yokka- ichi, Mie Pref., Japan	HIRATA YOKKA- ICHI MIE
MORISHITA FISHING NET MFG. CO., LTD.	Kajitani, Hinase-cho, Wake- gun, Okayama- Pref., Japan	MORISHITANET BIZ
THE NIPPON GYOMO SEN- GU KAISHA, LTD.	Nippon Bldg., 2-chome, Ote- machi, Chiyoda-ku, Tokyo	GYOMO TOKYO
NITTO SEIMO COMPANY, LTD.	20-15-701, Shimbashi 2-chome, Minato-ku, Tokyo	SEIMONITTO TOKYO
NIPPON KENMO CO., LTD.	1578 Eba, Kuwana-city	NIPPONKENMO KUWANA
TAITO SEIKO CO., LTD.	No. 21, 1-ban, 1-chome, Higashi-shimbashi, Minato- ku, Tokyo	TAITOROPE TOKYO
TOYAMA FISHING NET MFG. CO., LTD.	20, 2-chome, Awaji-machi, Higashi-ku, Osaka	TOYANET OSAKA
YOKOYAMA FISHING NET MFG. CO., LTD.	Mushiake Okuchi, Oku-gun, Okayama Pref.	
HAKODATE SEIMO SENGU CO., LTD.	17-14, Suehiro-cho, Hakodate, Japan	
OHMI NETTING CO., LTD. AMITA COMPANY LTD.	Maibara, Shiga Pref., Japan Toyohashi, Aichi Pref.	SILKNET MAIBARA AMICO TOYO- HASHI
TOYOHASHI NENSHI FISHING NET CO., LTD.	No. 26-5, Makino, Makino-cho, P.O. Box No. 52, Toyohashi, Japan	TOYONEN TOYO- HASHI
IJIMA NET MFG. LTD.	1-1, Matsuba Isshiki-cho, Gamagori, Aichi Pref., Japan	AICHI KATANO- HARA "MARUSHIMA"

JAPANESE FISHERIES

<i>Name</i>	<i>Address</i>	<i>Cable Address</i>
● Tin(Can) ●		
HOKKAI CAN CO., LTD.	Naigai Bldg., Marunouchi, Chiyoda-ku, Tokyo	HOKKAI CAN TOKYO
TOYO SEIKAN KAISHA LTD.	Saiwai Bldg., 3-1 Uchisaiwai- cho, 1-chome, Chiyoda-ku, Tokyo, Japan	TOYOSEIKAN TOKYO
● Processing Equipment ●		
OMORI MACHINERY CO., LTD.	7-4, Negishi 5-chome, Taito-ku, Tokyo, Japan	
TOYO FOOD EQUIPMENT CO., LTD.	5 Yako-cho, Tsurumi-ku, Yokohama Japan	
HANAKI MANUFACTUR- ING CO., LTD.	4-2 ban 1-chome, Matsugaya, Taito-ku, Tokyo, Japan	M.F.G. HANAKI TOKYO
● Navigation Equipment (Fish Finder) ●		
ANRITSU ELECTRONIC WORKS, LTD.	Suyama Bldg., 1-1, Ebisu- minami, Shibuya-ku, Tokyo, Japan	
FURUNO ELECTRIC CO., LTD.	85, Ashihara-cho, Nishino- miya-city, Japan	TFO79831051 FURUNO KOBE
KOBE INDUSTRIES CORP.	1-5, Wadayama-dori, Hyogo- ku, Kobe, Japan	KOBE INDUSTRIES KOBE
KODEN ELECTRONICS CO., LTD.	10-45, Kamiosaki 2-chome, Shinagawa-ku, Tokyo, Japan	KOELEC TOKYO
NANAYO ELECTRIC CO., LTD.	25-5, 2-chome, Chuo-cho, Meguro-ku, Tokyo	NANAYOEL TOKYO
JAPAN RADIO CO., LTD.	5th Mori Bldg., 25, Shiba Sakuragawa-cho, Minato-ku, Tokyo, Japan	JAPANRADIO TOKYO
ZENIYA ALUMINUM ENGINEERING, LTD.	5-29, Kikawa Nishino-cho, Higashi-yodogawa-ku, Osaka, Japan	
KUBOTA METEOROLOGIC- AL EQUIPMENT CO., LTD.	17, 3-chome, Shintomi-cho, Chuo-ku, Tokyo, Japan	SONDEKMC TOKYO
RYOKUSEISHA CORP.	2-15-14, Tsukiji, Chuo-ku, Tokyo	

LIST OF PRIVATE ENTERPRISES RELATED TO FISHERY

<i>Name</i>	<i>Address</i>	<i>Cable Address</i>
KYORITSU DEMPA CO., LTD.	441, Nakameguro 2-chome, Meguro-ku, Tokyo, Japan	KYORITSURADIO TOKYO
TOKYO KEIKI SEIZOSHO CO., LTD.	16, 2-chome, Minami-kamata, Ota-ku, Tokyo Japan	TOKYOKEIKI TOKYO
TOYO RADAR CO., LTD.	11-30, Sakuragaoka, Hodogaya-ku, Yokohama	
TAKEDA RIKEN INDUSTRY CO., LTD.	285, Asahi-cho, Nerima-ku, Tokyo, Japan	TRI TRONICS TOKYO
NIPPON ELECTRIC CO., LTD.	7-15, Shiba 5-chome, Minato-ku, Tokyo	"MICROPHONE" TOKYO
TAIYO MUSEN CO., LTD.	20, 2-chome, Ebisu-Nishi, Shibuya-ku, Tokyo	TAIYO WIRELESS TOKYO
ASAHI DENKI KOGYO K.K.	No. 32-11, 1-chome, Kitasaiwai, Nishi-ku, Yokohama, Japan	RADIO ASAHI
OKI ELECTRIC INDUSTRY CO., LTD.	10, Shiba Kotohira-cho, Minato-ku, Tokyo, Japan	OKIDENKI TOKYO
KATO SEISAKUSHO	2-1, Honcho, Nihonbashi, Chuo-ku, Tokyo, Japan	
KAIJO DENKI CO., LTD.	19, 1-chome, Kanda Nishiki-cho, Chiyoda-ku, Tokyo	MARINEINSTRU TOKYO
SANKEN ELECTRONICS CO., LTD.	1907 Sebongorin, Numazu, Shizuoka, Japan	SANKEN NUMAZU

Illustration of Important Fishes in Japan

I Marine Fisheries

A Marine Mammals

Blue whale
Shironagasukujira
Balaenoptera musculus



Fin whale
Nagasukujira
Balaenoptera physalus



Sei whale
Iwashikujira
Balaenoptera borealis



Sperm whale
Makkokujira
Physeter catodon



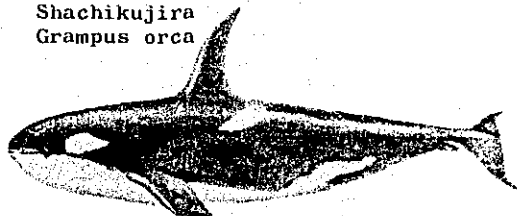
Mink whale
Koiwashikujira
Balaenoptera acuto-rostrata



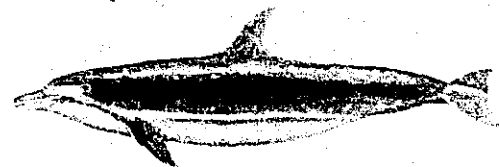
Pilot whale
Gondokujira
Globicephalus melas



Killer Whale
Shachikujira
Grampus orca



(Dolphin)
Mairuka
Delphinus delphis delphis



Right whale
Semikujira
Balaena glacialis sieboldii

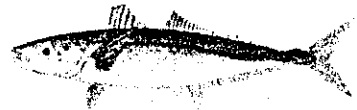


B Fishes

Herring
Nishin
Clupea pallasii



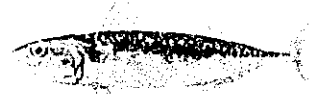
Scad
Muroaji
Decapterus muroadsi



Sardine
Maiwashi
Sardinops melanosticta



Mackerel
Masaba
Scomber japonicus



Round herring
Urumeiwashi
Etrumeus micropus



Saury (Saury-pike)
Sanma
Cololabis saira



Anchovy
Katakuchiiwashi
Engraulis japonica



Yellowtail
Buri
Seriola quinqueradiata



Horse mackerel
Maaji
Trachurus japonicus



Skipjack
Katsuo
Katsuwonus pelamis



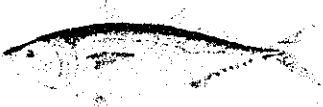
Frigate mackerel
Kirasoda
Auxis thazard



Striped marlin
Makajiki
Makaira mitsukurii



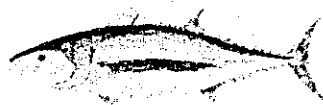
Bluefin tuna
Maguro
Thunnus thynnus



Broadbill swordfish
Mekajiki
Xiphias gladius



Albacore
Binnaga
Thunnus alalunga



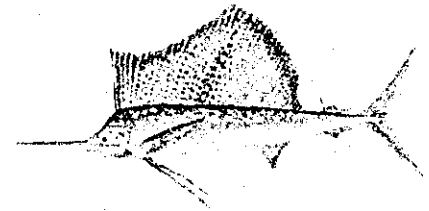
Black marlin
Kurokajiki
Makaira mazara



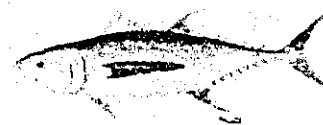
Bigeye tuna
Mebachi
Parathunnus obesus



Sailfish
Bashokajiki
Histiophorus orientalis



Yellowfin tuna
Kiwada
Neothunnus albacora



Chum salmon
Sake (Shirozake)
Oncorhynchus keta



Cherry salmon
Sakuramasu
Oncorhynchus masou var. *masou*



Bastard halibut
Hirame
Paralichthys olivaceus



Dab (Flat fish)
Magarei
Limanda Herzensteini



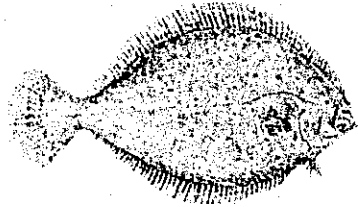
Arrow toothed halibut
Aburagarei
Atheresthes evermanni



(Flat fish)
Sohachigarei
Cleisthenes pinetorum Herzensteini



Frog flounder
Meitagarei
Pleuronichthys cornutus



Roundnose flounder
Mushigarei
Eopsetta grigorjewi



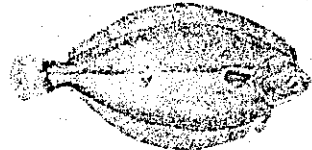
Flathead flounder
Akagarei
Hippoglossoides dubius



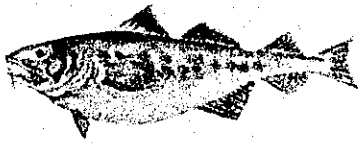
Slime flounder
Babagarei
Microstomus achne



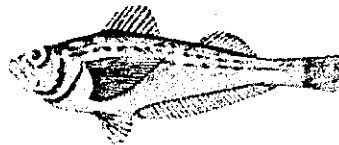
Fluke
Hireguro
Glyptocephalus stelleri



Cod
Madara
Gadus macrocephalus



Sand fish
Hatahata
Arctoscopus japonicus



Alaska pollack
Sukesodara
Theragra chalcogramma



Deep sea smelt
Nigisu
Argentina semifasciata



Atka mackerel
Hokke
Pleurogrammus azonus



Great blue shark
Yoshikirizame
Glyphis glaucus



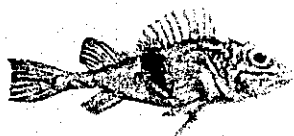
(Rock fish)
Sankomenuke
Sebastes flameus



Salmon shark
Nezumizame
Lamna ditropis



(Rock fish)
Kichiji
Sebastolobus macrochir



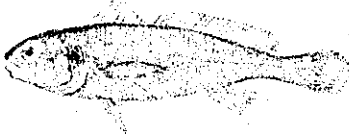
Dog fish
Aburatsunozame
Squalus acanthias



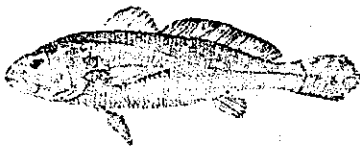
White croaker
Shiroguchi
Argyrosomus argentatus



Yellow croaker
Kinguchi
Pseudosciaena manchurica



Black croaker
Kuroguchi
Argyrosomus nibe



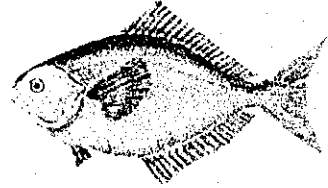
(Croaker)
Honnibe
Miichthys imbricatus



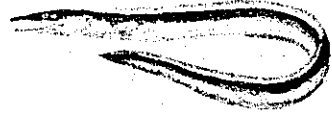
Lizard fish
Maeso
Saurida argyrophanes



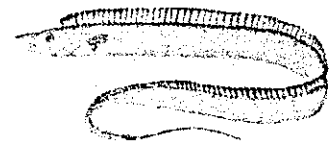
Butter fish
Ibodai
Psenopsis anomala



Sharp toothed eel
Hamo
Muraenesox cinereus



Hairtail
Tachiuo
Trichiurus lepturus



(Gurnard)
Hobo
Chelidonichthys kumu



(Gurnard)
Kanagashira
Lepidotrigla microptera



Stingray
Akaei
Dasyatis akajei



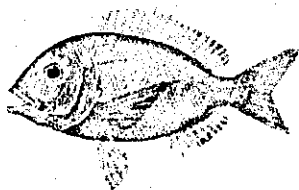
Red sea bream
Madai
Chrysophrys major



Crimson sea bream
Chidai
Evynnis japonica



Yellow sea bream
Kidai
Taius tumifrons



Black sea bream
Kurodai
Mylio macrocephalus



Spanish mackerel
Sawara
Scomberomorus niphonius



Dolphin fish
Shiira
Coryphaena hippurus



Flyingfish
Tobiuo
Prognichthys agoo



Mullet
Bora
Mugil cephalus



Common sea bass
Suzuki
Lateolabrax japonicus



Sand lance
Ikanago
Ammodytes personatus

Striped pigfish
Isaki
Parapristipoma trilineatum

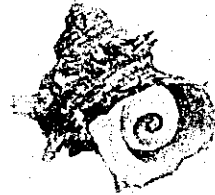
(Globe fish)
Torafugu
Fugu rubripes



C Shellfishes

Abalone
Awabi
Haliotis gigantea

Top shell
Sazae
Turbo cornutus



Short necked clam
Asari
Venerupis Philippinarum

Hard clam
Hamaguri
Meretrix lusoria



Hen clam
Hokkigai
Mactra sachalinensis



(Pearl Oyster)
Akoyagai
Pinctada martensii



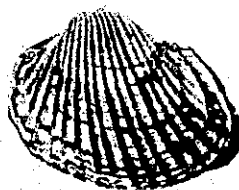
Common scallop
Hotategai
Pecten yessoensis



(Oyster)
Magaki
Crassostrea gigas



"Mogai" clam
Sarubo
Anadara subcrenata



D Other Marine Animals

Common squid
Surumeika
Ommastrephes sloani pacificus



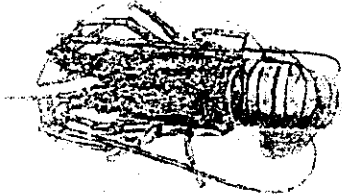
Cuttlefish
Maika
Sepiella maindronide



Octopus (Devilfish)
Madako
Octopus vulgaris



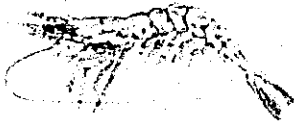
Spiny lobster
Iseebi
Panulirus japonicus



(Prawn)
Kurumaebi
Penaeus japonicus



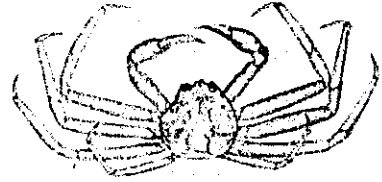
(Shrimp)
Akaebi
Metapenaeopsis barbatus



King crab
Tarabagani
Paralithodes camtschaticus



Red crab
Zuwaigani
Chionoecetes opilio



Blue crab
Gazami
Neptunus trituberculatus



(Sea urchin)
Murasakiuni
Heliocidaris crassispind



(Sea cucumber)
Manamako
Stichopus japonicus



(Jelly fish)
Bizenkurage
Rhopilema esculenta



E Seaweeds

(Kelp)
Makonbu
Laminaria japonica



(Seaweed)
Honfunori
Gloiopeltis tenax



(Seaweed)
Wakame
Undaria pinnatifida



(Seaweed)
Arame (Kajime)
Eisenia bicyclis



Agar-agar
Tengusa (Makusa)
Gelidium Amansii



(Seaweed)
Asakusanori
Porphyra tenera



II Inland Water Fisheries

A Fishes

Rainbow trout
Nijimasu
Salmo gairdnerii irideus



Brook trout
Kawamasu
Salvelinus fontinalis fontinalis



Bull trout (mountain trout)
Iwana
Salvelinus pluvius



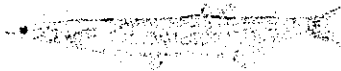
Pond-smelt
Wakasagi
Hypomesus olidus



Sweet fish
Ayu
Plecoglossus altivelis



White bait
Shirauo
Salangichthys microdon



Common carp
Koi
Cyprinus carpio



Crucian carp
Funa
Carassius auratus



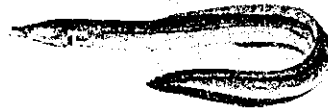
(Minnow)
Ugui
Tribolodon hakonensis hakonensis



(Minnow)
Oikawa
Zacco platypus



Eel
Unagi
Anguilla japonica



Loach
Dojo
Misgurnus anguillicaudatus



Goby
Mahaze
Acanthogobius flavimanus



Sculpin
Kajika
Cottus pollux



(Shiner)
Tanago
Acheilognathus moriokae



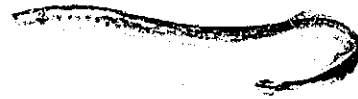
Cat fish
Namazu
Parasilurus asotus



(Minnow)
Honmoroko
Gnathopogon caeruleus



Lamprey
Kawayatsume
Entosphenus japonicus



B Others

(Shrimp)
Nukaebi
Paratya compressa improvisa



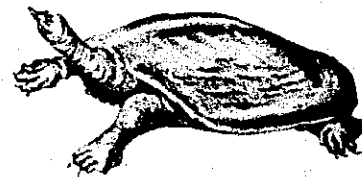
(Corbicula)
Yamatoshijimi
Corbicula Japonica



Opossum shrimp
Isazaami
Neomysis intermedia



Snapping turtle
Suppon
Amyda japonica



Bull-frog
Ushigaeru
Rana catesbiana



(Aquatic plant)
Kawanori
Prasiola japonica



