An Outline of Japanese Fisheries, Fisheries Research, and Education of Fisheries Science in Japan*

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First of all, I thank you for your kindness to accept me in this Institute as a guest scientist for two months. Early April, the Director, Jón JÔNSSON suggested me to talk to you about the Japanese fisheries research work. It is the greatest honor for me to be given such an opportunity to inform you about Japan. Now, I am going to talk about an outline of the Japanese fisheries, fisheries research work, and the education of fisheries science in Japan, briefly. Please listen to me for a short time.

1. Introduction—Background of the Japanese fisheries

As you already know, I guess, Japan is also a volcanic country like this country. It has a chain of four major islands, stretching several thousand kilometers from the southwest to the northeast. It spreads from 25° to 46° north latitude. There are innumerable small islands, bays, and a long complicated coastline. The big warm stream, the *Kuroshio*, washes the coast from the south and the cold current, *Oyashio*, brings rich nutrients from the north. Based on such a geographical and oceanographical situations, the natural production of marine life is very rich around the country.

On the other hand, the area of Japan is about 37×10^4 km^2 and its populations reached 1.17×10^8 in 1980. Only 16% of the area is arable and there are few mineral and oil resources. Under such a pressure, the Japanese have depended upon the fish from old times. The importance of fish is clearly shown in this figure (Fig. 1).

In this figure, this horizontal axis shows the animal protein supply in grams per capita per day and this vertical axis shows the animal protein supply from marine products. Here is Japan and this country is here. In Japan, the animal protein supplied from marine products is about four times that of the other developed countries. It is about half of total animal protein supplied.

The importance of fish means the importance of the fisheries economically. The economic important role of Japanese fisheries other than supply of food are summarized as follows:

First, the net product in value of Japanese fisheries reached about 13×10^{11} Japanese yen in 1975, holding 1% of the gross national product in Japan. It is equal to 12×10^{10} Icelandic kronur at the present exchange rate.

Secondly, the Japanese fisheries indeed supplied work for 46×10^4 fishermen in 1980 (Table 1). It also occupied about 1% of total employee.

Thirdly, Japanese fisheries have accerelated the development of the related industries, such as fish processing, freezing, shipbuilding, fishing gear, fishing machinery and so on.

Finally as you have also already done, the products of fisheries and fish processing industries can acquire the foreign currencies through the export. The Japanese export of marine products in value was about 24×10^9 kronur in 1980, as compared to the Icelandic export of 3.3×10^9

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この英文は，筆者が1983年4，5月の2カ月，北欧アイスランド共和国の海洋研究所（漁業省所属）に滞在中，Jón 所長に乞われて行なった講演の原稿である。

原稿を現地で書いたため，こまかい数字がわからなかったり，書き急いだために思いちがいや間違いもあるかも知れないが，すでに済ませたものであるので，あまり手を加えずに御参考に供することにした。実際には1/3を間引いて，向うの希望する40分で読み，その後で20分の質疑の時間を設けた。

なお，日本の読者が熟知しているわが国周辺の海流図や漁獲資料などの図表をここでは割愛した。また，望まれて原稿を図書室に残して来たが，その訂正原稿を作り直した時に 2，3 の脚注をつけた。

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Table 1. The basic statistics of Japanese fisheries in 1980 (Ministry of Agriculture, Forestry and Fisheries, Government of Japan (1982), Japan Fisheries Association (1982), and Central Bank of Iceland (1983)).

			cf Iceland (1981)
1.	Total fisheries productions	111×10^5 tons	$1,435\times10^3$
2.	Value of fisheries productions (not including fish processing products)	$2,771\times10^9$ Jap. yen (252×10^9 Icl. kr.)	2.7×10^9 kr.
3.	Number of fisheries managements (enterprises)	21.6×10^3	
4.	Number of fishermen (not including fish processing)	46×10^4	18×10^3 (including processing)
5.	Number of powered fishing vessels and boats (7400 among them were above 50)	417×10^3	840
6.	Number of fishing ports	2,866	65
7.	Number of wholesale fish market	1,111	
8.	Number of fish stores	56,600	
9.	Number of Ice-making plants	1,266	
10.	Number of freezing plants	1,298	
11.	Number of fish processing plants	22,500	
12.	Export of fisheries products	265.3×10^9 yen (24.1×10^9 kr.)	5.1×10^9 kr.
13.	Import of fisheries products	764.3×10^9 yen (69.5×10^9 kr.)	

kronur in the same year. This value of Japanese export of fisheries products was about 1% of the whole export of Japan in 1980. Now, I think, you can also understand the economic importance of Japanese fisheries.

2. An outline of Japanese fisheries

As already mentioned, the Japanese have been one of the fish-eating nations in the world from old age. However, the World War II destroyed the Japanese fishing industry, fundamentally. The 1945 (this was end year of war) total catch was only 1.8×10^6 tons. The peak catch in pre-war was 4.9×10^6 tons in 1936, of which 1.6×10^6 tons were sardine, *Sardinops melanosticta*.

When the ban of fisheries by the Head quarters of occupied army was cancelled, the Japanese fisheries made a new start. It was recovered year by year and the catch in 1951 reached a total of 4×10^6 tons same as the pre-war peak.

In recent years, the Japanese catch exceeded 10^7 tons. However, some remarkable changes were seen in the catch composition in fishery type and in fish species caught. In this figure, we can see the recent decreasing of catches in the distant waters fisheries, such as north Pacific bottom trawls, because of the regulation by the 200 miles zone of U.S.A. and U.S.S.R. And we can see the rapid increase of catch in the off shore fisheries such as purse seine fishery for sardine and mackerel, *Scomber japonicus*.

The catches of coastal fishery has been unchanged. This slight increase tendency is caused by the increase of marine aquaculture production.

Now, roughly speaking, there are three types of fishery resources around Japan.

The first is a wide migrative fish, such as skipjack, *Katsuwonus pelamis*, tunas, *Thunnus* spp. and marlins, *Makaira* spp. These are all rather big and very tasty. The skipjack migrate near to Japan from the south in early summer through autumn and they are caught by angling with a long pole and a short line.

The second group also has a wide distribution, but migrates only in the coastal and off shore area of Japan. They are sardine, mackerels, squids, *Thodarodes* sp. and *Loligo* sp., jack mackerel, *Trachurus japonicus*, saury, *Cololabis saira* and yellowtail, *Seriola quinqueradiata*. Their spawning are in Japanese waters. Most of these pelagic fish are caught in large quantities and therefore, very important fishery resources in Japan.

The third group is demersal fish, including shellfish. Their migrative areas are rather limited. There are about 100 species of flatfishes in the Japanese waters. Alaska pollack, *Theragra chalcogramma*, cod, *Gadus macrocephalus*, sandeel, *Ammodytes personatus*, and redfish, *Pagrus* spp. also belong to this group.

Many species of sea algae are also important resources for the Japanese.

Fig. 5 shows that the catch of Alaska pollack was dominant several years ago, which was taken by bottom trawls in the north Pacific and Bering sea.

Following the Alaska pollack, the mackerel was caught in the offshore and coastal area by purse seiners. However, today, the sardine catch exceeds 3×10^6 tons per year and the mackerel catch has decreased below 10^6 tons.

Such an alternation of the dominant fish species caught, especially in pelagic fish, have been seen from the beginning of this century. It is thought to be caused, sometimes, by the change of fish community and sometimes by the change of fisheries activity. At first, herring *Clupea pallasii* dominated during the beginning of this century, followed by the sardine around 1936. However the sardine catch decreased from around 1950 and dropped to only 8×10^3 tons in 1965. In this figure, we can see that after World War II the dominant fish species changed, that is, saury for 1958 and 1959, jack mackerel from 1960 to 1964, mackerel from 1965 to 1980 and sardine again from 1981.

Moreover, we can find the two important phenomena in this figure. First, the total catch of these pelagic fish has shown rather small variation and steady increasing tendency from 2×10^6 tons at the early 1950's to 3×10^6 tons at the middle of 1970's.

Secondly, when the population size of a fish species once decreases to the lowermost level, such as in the cases of herring and sardine, it can not recover easily to the original level, even if there is no fishing effort. The ecological niche of the decrease species seems to be occupied by the other fish species. In the case of Japanese sardine, the niche was thought to be partly occupied by anchovy, *Engraulis japonica*. The same phenomenon has happened in the case of anchoveta off the Peruvian coast.

Table 2 shows the Japanese catch by fish species and by fishing methods. As for the fish species, sardine, Alaska pollack and mackerel are dominant in this order. And the most weight of the catch was obtained by purse seiners, followed by trawls and anglings.

The 86 % of both sardine and mackerels were caught by purse seine, and 89 % of Alaska pollack and 84 % of flatfishes were taken by towed nets, especially by various size of bottom trawlers. 85 % of skipjack and 66 % of squids were taken by angling. 73 % of tunas were caught by longlines. Finally, the 96 % of saury were caught by the sticked pole liftnet with fish lamps. As in the Table 2, a total of 99×10^6 tons of catch was obtained in the year 1980. Besides, 99×10^4 tons of marine organisms were produced by aquaculture, as are remarked in the Table 1. 51×10^4 tons, about half of the aquaculture production were seaweeds. 31×10^4 tons of shellfish were also cultured. The fish cultured was 17×10^4 tons. Among them, 15×10^4 tons were yellowtail. Including freshwater aquaculture, the aquaculture production of several fish were more than that of the fishery (Table 3). As shown here, especially all of the oyster and laver, *Porphyra* spp., were cultured. The yellowtail, eel, carp, sea urchins and *Undaria*, a kind of brown algae were produced more by aquaculture than by fishery. Some of these fish are reared by feeding with meat of sardine and mackerels taken by purse seine in large quantities. The fish culture is producing more tasty and more expensive fish. But, on the other hand, it is often said to be only a wasting of the sardine and mackerels in large quantities.

Now, I want to speak a little about Japanese fish farming. As in this table 533×10^6 of seedlings of various fishes were artificially produced in 1980. Most of them were released into the sea and some of them were cultured in the big fish pens set in the sea.

As for salmon *Oncorhynchus keta*, 19×10^8 of fries were liberated into the rivers in 1980. By the way, the return of adult salmon reached 22×10^6 in number, 80×10^3 tons in 1980. The return rate was calculated to be 2.8 %. This is the changes in the number of fry liberated and the number of adult fish of Japanese salmon returned (Fig. 7).

Total production in value by the fisheries and aquaculture attained to 2771×10^9 Japanese yen (equivalent to 252×10^9 Icelandic kronur) in 1980, including the production in freshwater fisheries and aquaculture, and by whaling. The average price of fish (not including processed fish products) was 23×10^3 Icelandic kronur per ton in Japan. This was about 5 times that of the Icelandic price of fish in average.

As in the Table 1, those productions were landed by about 46×10^4 fishermen belonging to about 22×10^4 fisheries enterprises, using 42×10^4 fishing vessels and boats.

The total extents of Japanese fisheries are so big as this. However, almost all the enterprises belong to the individuals, with a small fishing boat, less than 10 tons, that is, about 20×10^4 enterprises work on the coastal fisheries, such as anglings, small gill nets and the other fishing gears. Most abundant size of the ships is a class from only 1 to 3 tons.

There are about 10^4 middle class fishery enterprises with ships from 10 to 1000 tons, which are engaged in the purse seiners in off shore area, tuna longlines and trawls in the distant waters.

A few big companies with capital of above 10^7 kronur also exist in Japan. These companies are working on the distant water fisheries such as trawls, tuna longlines, whaling and mothership type salmon gillnets.

Fisheries regulation in Japan

Last day, I learned from Dr. Jakob MAGNUSSON that in this country there are some fisheries needing permission by the Government. In Japan, also, almost all the fisheries are regulated by the central or local government for the economic and political adjustment of fisheries and conservations of fishery resources.

The large scale fisheries, such as distant sea trawls, off shore and distant tuna longlines, pole and line fishery for skipjack, big purse seines, whaling etc. need the permission of the government. The Japanese government has to decide the number of fishing vessels, size of vessels, fishing season, fishing ground, and construction of fishing gears, in detail.

Even for small sized fisheries, such as small trawls, small purse seiners and others below 10 tons also have to get a permission of the Prefectural governors.

These are licensed regulation system of fisheries in Japan.

On the other hand, another fishery right system are there. There are three categories in fishery right system permitted by Prefectural governors. First, the set net fishery right for large set nets, second, the demarcated fishery right for marine aquaculture, and third, the common fishery right for common fisheries in the coastal regions. By these permissions, the fishermen or fishery cooperatives can obtain the right to occupy the part of public sea area exclusively for fishery and aquaculture.

Problems of Japanese fisheries

As already mentioned, the total extents of Japanese fisheries is indeed very big. However, it is not always good to have many big vessels well equipped and thus obtain a great amount of catch.

I think there are several problems in the Japanese fisheries economically. One of them is that there is too much fishing effort, that is, 22×10^4 enterprises and 46×10^4 fishermen are there. Almost all of enterprises are operated by only one man with one small boat for coastal fisheries.

Next, high cost caused by building of new ship and equipping with highly efficient fishing mechanics oppress the management of the middle class enterprises, which have vessels from 10 to 1000 tons. Those fishery enterprises are thought to be the backbone of Japanese fisheries in a way. In average, the ratio of debt to total capital exceeds 90 % in those enterprises. Their constitutions are economically very weak. The payment of the interest and return of the principal oppresses the management. If a ban such as for capelin in this country were recommended, I think there would surely be a small stormy trouble in Japan. But, probably, such a recommendation itself may not be proposed in Japan. The 200 miles fishery zone and recent high price of oil have brought the more complicated economic problems.

Furthermore, younger people do not like to eat fish so much, because of their small bones. The housewives do not like to cook the fish, such as sardine*, because of the smell and smoke when grilled and because it takes much time to cook the raw fish. Then, the price of fish does not raise. And, most Japanese people like to eat more shrimp and fishroe. They are paying more and more money to import those from foreign countries. Even, the big fishing companies also get more of their income from the commercial activity than the principal fishing activity.

Furthermore, the fishery resources are not always in a good situation in Japan, except for some pelagic fish, such as sardine and skipjack. The economic weakness of the fishery enterprises make them catch more in the case of the higher priced fish. In the case of low priced fish, they want to catch much more in quantity.

I have thought these years that the ideal form of fisheries must keep the well balance among following three factors, that is, the rational exploitation of fishery resources, the high income of fishermen, and economical consumption of fish landed. In the developed countries, very often the fishery resources have been threatened by overfishing. And, also even in developing countries, to keep the balance of the three factors seems to be very difficult. Though these developing countries have much unexploited fishery resources, the supply and consumption of fishery products are limited, because of inefficient fishing methods, shortage of fish storing accomodations and bad traffic conditions, as in many countries of Africa and Southeastern Asia.

In these countries, the fish landed are being only consumed at or near the landed port and do not circulate to the distant places in the country. Then, frequently, the price of fish, especially, fresh is very expensive in the places distant from the fishing ports.

* The sardine and mackerels were utilized as follows in 1980 (1,000 tons).

	Food		The others		
	Fresh	Processed	Fish meal	Aquaculture food	Total
Sardine	120	650	900	770	2440
Mackerels	120	730	70	380	1300

Boiled sardine paste, which is a little alike Icelandic fishball, has been produced for more effective use of the sardine protein.

3. Outline of fisheries researches in Japan

The systematic research works for fish populations are being undertaken by the Regional Fisheries Research Institute, which belong to the Fisheries Agency, Ministry of Agriculture, Forestry, and Fisheries, and the Prefectural Fisheries Experimental Stations.

As for the National Regional Fisheries Research Institute, the waters around Japan are divided into six regions according to the distribution of fish populations and characteristics of oceanic conditions. Then, there are six Regional Fisheries Research Institutes (RFRIs), that is, from the north (1) Hokkaido RFRI (in Kushiro), (2) Northeastern RFRI (in Shiogama), (3) Central RFRI (in Tokyo), (4) Japan Sea RFRI (in Niigata), (5) Southwestern RFRI (in Hiroshima) and (6) Western RFRI (in Nagasaki). Besides, Far Seas Fisheries Research Institute (in Shimizu), Aquaculture R. Institute (in Mie), Hokkaido Salmon Hatchery (in Sapporo), and Fisheries Engineering Research Institute (in Hazaki) are also there.

These RFRI cooperate with each other for the research of the migrating pelagic fish. However, each RFRI has special fish species or fish species group to research.

Hokkaido RFRI had worked on the spring spawning herring around the Hokkaido Island for the long time. But, now, there is no migration of spring herring along the coast of Hokkaido, the last dominant year class was that of 1939. Then, the present objectives of research work have been turned to the demersal and the other pelagic fish around the island. In Northeastern RFRI, the pelagic fish, such as saury and skipjack and the demersal fish are being studied. The Central RFRI is the biggest one. The Institute has the division of the fishery resources, fisheries oceanography and chemistry of marine products. This Institute is the center of the cooperative research work of the Pacific sardine and mackerels.

The Japan Sea RFRI is studying the pelagic and demersal fish in the Japan Sea. The Southwestern RFRI is concerned with the fish in the Seto Inland Sea and southwestern sea areas of Honshu Island.

The Western RFRI is working mainly on the demersal fish in the East China Sea. The Far Seas Fisheries Research Institute works on the fishery resources in the distant waters, such as tunas, marlins, northern Pacific demersal fish, seals and whales. Besides, there are 86 Prefectural Fisheries Experimental Stations in Japan. These Prefectural stations are engaged in the research of the fishery resources in the coastal and offshore area of their own prefecture and cooperate in the related research projects with the National Research Institutes.

The universities and colleges related to the fishery science sometimes cooperate with those research of the National Research Institutes and the Prefectural experimental stations in the fundamental fields to a various extents.

The Japanese government is now in a hurry to grasp the levels of Total Allowable Catch for various important Japanese fishery resources.

Eventually, the only country related actually to her 200 miles zone is USSR now. Between USSR and Japan, there has been some negotiations about the amount of catches by species within mutual 200 miles zone annually. These several years, Japan has caught 70×10^4 tons of fish, such as Alaska pollack, within the USSR's 200 miles zone and USSR has got 60×10^4 tons of pelagic fish, such as sardine within the Japanese 200 miles zone. Accordingly, now, it may be said the necessity to hurry up the decision of the level of TAC is not so urgent for Japan.

Here is a report named "Report of the Research on the Fisheries Resources within Japanese 200 miles zone". This was published from Japanese Fishing Agency and Regional Fishery Research Institutes in 1981. In this report, the present situations of all kinds of important fish in Japan are analyzed and estimated by various methods.

This mark instructs "be secret to outside". I think, however, some of the results described here are not actual and only the calculations on the desk.

Now, I would like to introduce some of them, especially the methods to estimate the population parameters which may be not used in this country.

The methods used in this report are various. The VPA method and the cohort analysis are also included. Here, I want to introduce only two methods used in Japan.

One of them is the method to estimate the size of parental stock by the estimation of total egg numbers in the sea, mean fecundity by age, and age composition data. This method was applied to the Pacific sardine and mackerel. Then, as for the Pacific mackerel, from the other findings also, the scientists of the Central Regional Fisheries Research Institute state that though the abundance of the Pacific mackerel has been maintained in higher levels for more than 10 years, but there is a decreasing tendency in the number of eggs spawned and as also the actual catch has exceeded the TAC, they concluded that the tendency of this fish from now must be watched carefully.

The other one is a little sophisticated method*, first used by DOI (1962) for the king crab population off the west Kamchatka.

If the recruitment size of a fish, R, and survival rate, S, are assumed to be constant, the population size in number, N, is expected to be

$$N=\frac{R}{1-S} \qquad (1)$$

then, catch in number, C, is conventionally,

$$C=EN=\frac{FN}{F+M}(1-S)=\frac{FR}{F+M} \qquad (2)$$

where, E is the rate of exploitation, F is fishing mortality coefficient and M is natural mortality coefficient.

$$F=qf,\ \text{so}\ \frac{f}{c}=\frac{F+M}{qR}=\left(\frac{1}{R}\right)f+\frac{M}{qR} \qquad (3)$$

where, q is catchability coefficient and f is fishing intensity. Equation (3) means that there is a linear relationship between f and f/c. Then by plotting f/c against f, we can get the estimate of R and ratio of M to q from this linear regres-

* This method has an inconsistency essentially. Namely, in spite of the assumption that the survival rate, S is constant, f, the fishing intensity is expected to vary.

sion. The results, applied to the Japanese fish populations, show the decrease of the size of recruitment in several cases.

The academic societies in Japan

There is a big society called "Japanese Society of Scientific Fisheries". About 3800 people are members. The Society publish the journal "Bulletin of the Japanese Society of Scientific Fisheries" monthly. They have biannual regular meetings in spring and autumn and several hundred papares are read in each. Besides, there are several specialized academic societies related to the Fisheries Science in Japan such as Oceanographical Society of Japan, Ichthyological Society of Japan, Research groups of Aquaculture and Aquapropagation, Japanese Plankton Society, Society of Fish Pathology, Society of Fisheries Oceanography, and Research group on fish genetics and breeding science.

4. Education of fishery science in Japan

There are prefectural fishery high schools with 18×10^4 students, the national and private colleges and universities in Japan. There are 13 national universities and colleges, four private universities with fisheries faculty. The number of students in these universities and colleges are about 6×10^3 in total.

As for my Department of Fisheries, University of Tokyo, it belongs to the Faculty of Agriculture and was established 75 years ago. About my university, as I gave the University Catalogue to the director, Jón JÓNSSON, please read it, if you want to know more detail.

In my Department, there are 6 laboratories, namely laboratory of Fisheries biology, this is my laboratory, Aquatic biology, Marine biochemistry, Fish physiology, Fisheries oceanography, and Technology of marine products. There are 6 professors, 6 associate professors and 13 instructors and others. The number of students are 40 in total.

In Japan, the present system of national education are as follows, that is, 6 years for elementary school, 3 years for junior high school, and 3 years senior high school. And then, 4 years are for university or college except for medicine and veterinary medicine.

Now, let me touch our 6 laboratories briefly.

The laboratory of Fisheries biology also covers the fish population dynamics. The main theme in the laboratory of Aquatic biology is fish pathology. The laboratories of Marine biochemistry and Technology of marine products are working on the marine toxins, and characteristics of proteins and peptide of fish. The laboratory of Fish physiology works mainly on the photo- and thermo-regulation system of fish maturation. Lastly, the laboratory of Fisheries oceanography works on artificial production of seedlings of fish and basic problems of the mass production of fish food at their early stage, such as rotifer, a protozoa. The curriculum is also shown in the University Catalogue.

The graduate course of our Department consists of our 6 laboratories and 6 divisions among 15 of the Ocean Research Institute in our university. The 6 divisions are as follows, that is, Marine planktonology, Marine microbiology, Population dynamics of marine organisms, Biology of fisheries resources, Fisheries oceanography, and Fisheries ecology. For other details, please read the University Catalogue later. There are two years Master course and three years Doctor course. All the students are required to get some definite units of lectures and to submit their theses. The number of students are defined as 18 for Master course and 12 for Doctor course per year with the exception for foreign students. Many foreign students are there, mainly from southeastern Asian countries. In my laboratory, there are now 6 Japanese students and 3 foreign students. One from Ethiopia, one from Bangladesh and the last is from Indonesia.

5. Concluding remarks

Now, I would like to pay my respect to your activities to obtain the precise and abundant data about various fish populations and sea conditions. And, there are many impressive points in this Institute and in your fisheries during my short stay. Only three points are now enumerated.

The first is about mesh size of nets. When I arrived at Reykjavik March 31st was the beginning of the Easter Holidays and this Institute was also closed. Then, I walked every day in the town. When I went to the harbour, I found a pile of nylon gillnets with big ring floats on the pier. I asked an old fisherman. "What fish do you catch by this gillnets?" I expected to hear the name of fish. But without answer, he ran into the old small fishing house and at once came out with a scale. And he showed me the mesh size was exactly 155 mm. Maybe, he took me for some fishery inspector. What I want to talk about now is not his mistake but my astonishment to know mesh size of 155 mm. "How large!" I felt so at that moment. Later, I learned that the mesh size of cod end of trawl net for cod is regulated to be 155 mm too in this country. I have brought no data about mesh size of Japanese trawl nets. But, I remember one instance about the mesh size of Japanese trawl nets in the East China Sea. About 20 years ago, based on the recommendation of the Western Fisheries Research Institute, an agreement to enlarge the mesh size of cod end from 38 mm to 54 mm was effected. However, the performance came to nothing before one knew. Probably it was caused by the economic weakness of some enterprises*.

Secondly, your quick treatment (processing) of data, for example, otolith reading of cod fish, and your bold recommendation about Total Allowable Catch for many important fish species must be highly praised, I believe.

* The cod end of 54 mm are used now. The small mesh size of Japanese trawl nets is partly caused by that the size of fish species caught are rather small.

And thirdly, I find it rather impressive that your research vessel can keep as much as 40 tons of frozen samples. I have no data now about Japanese research vessels. But, maybe, they do not have such a capacity. I think I have found here the good attitude of both your Institute and the Ministry of Fisheries to understand the importance and requirement of the fishery research work.

At last, I thank you again to be given such a good chance to speak to you. Moreover, I would like to express my thanks to Mrs. Unnur for her review of my draft, to Miss Kristin, for her typewriting and to Mr. Eirikur for his help given to me in the preparation of my draft.

Thank you very much for your listening to my broken English for a long time. Thank you.

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