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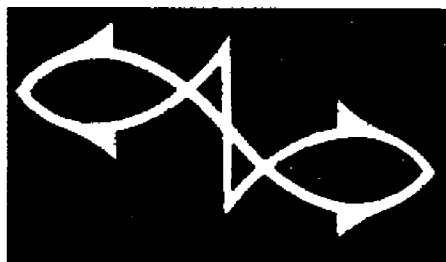
**OPERATION OF  
THE  
JAPANESE FISHERY MANAGEMENT SYSTEM**

**By**  
**WILLIAM C. HERRINGTON**

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OPERATION OF  
THE  
JAPANESE FISHERY MANAGEMENT SYSTEM

By  
William C. Herrington

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## Introduction

The general framework of the Japanese fishery management system is well described in various papers and reports, particularly Comitini "The Management System in the Japanese Marine Fisheries". Further information is available from "Fishery Agency Establishment Law" 1948, the "Fisheries Law" 1949, the "Fishing Vessel Law" 1950, "Japanese Fisheries" 1960 and 1967, and "Outline of Fishery Cooperative Movement in Japan" April 1968. However, as any practicing field administrator of participating fishermen knows, the way regulatory measures work out in the field may be rather difficult to determine from the legal and statistical documents in the files. The effectiveness of such a system, and the manner in which it actually functions, usually can be better understood and evaluated by observation and discussion in the field with those directly involved in the fishery and its administration.

The direct purpose of the project covered in this report was to examine how the Japanese management system functions in the coastal fisheries at the working level, its impact on the fisherman, the fishing communities and the resources, and to learn what the participants think of the system and what changes, if any, they would favor. The indirect purpose was to examine whether any features of the Japanese system might directly or with modifications be useful in our attempts in the U.S. to work out and apply more effective procedures for managing U.S. fishery resources. It was not the intent to make any special study of the organization and operation of the National or Prefectural fisheries departments, of fishery cooperatives or fishing methods, or of aquaculture. Such studies would be projects in themselves and would have required much more time than was available. One consequence of this was that later when drafting the report, I frequently found that my notes did not include certain interesting and useful auxiliary information relating to these subjects. Such lack can be justified, if at all, only by the necessity of avoiding diversions from the main line of inquiry. Such diversions often take one far afield at the expense of the main subject. This is a lesson I learned in Japan some 20 years ago which I found continues to be valid.

With these objectives in mind I planned to spend several days in Tokyo talking with officials of the Fishery Agency and National Federation of Fisheries Co-operative Associations to obtain general background information and to secure their advice as to which fishing villages would provide good examples of mixed fisheries including coastal trawling and aquaculture. From previous experience in Japan I was aware of the danger, because of language and other differences in living and thought patterns, of drawing incorrect conclusions from discussions that were too limited in time and scope. To avoid such erroneous conclusions one needs not only the direct answer to the question but also some understanding of the system of which this information is a part. I therefore planned to spend several days in each village or area visited. After considerable discussion and with the generous help of old friends Mr. Takitoshi Ando, President of the National Federation of Fisheries Co-operative Association and Mr. Iwao Fujita, President of the All Japan Fishery Association, two locations were decided upon. The first was Awajishima in the Inland Sea southwest of Kobe, and the second Obama, located at the head of Wakasa Bay on the Sea of Japan north of Kyoto. As things developed three days were spent in Tokyo talking with officials of the government and national fisheries organizations, three days in Sumoto

and Yura on Awajishima and two days at Obama and nearby Hyuga. Later a short visit was paid to Miyagi prefecture officials at Sendai. The various officials of the Hyogo, Fuku, and Miyagi prefectural governments, Sumoto city, and several fishery cooperatives were very hospitable in their reception, and accommodating and patient in answering my numerous questions. William Atkinson did an excellent job as interpreter and rapidly mastered the special terms used in the field of fisheries. Clint Atkinson, our Fishery Attache in Japan, rates a very special note of appreciation. His everready counsel and help in planning the trip, his assistance in securing appointments with officials in government and industry, and his help and that of other Embassy people in making travel arrangements, were invaluable. Without this help the project could not have been completed in the time available, if at all.

## Fishing Rights, Licenses and Cooperatives

The four main islands which make up Japan have an area about equal to that of California and their rugged mountain terrain leaves only about 15% of the area suitable for cultivation. The cultivable areas, where most of the population is concentrated, are found in narrow margins along the coast and in the narrow river valleys. Thus a large proportion of the people in feudal times and since have been unusually crowded on the sea coast with steeply rising mountains at their backs, looking to the sea for much of their livelihood and food. The many fishermen competing on the limited coastal fishing grounds stimulated numerous disputes within and between coastal communities. To help resolve these disputes the feudal lords granted fishery rights to the village communities and encouraged them to work out their problems among themselves. Thus these rights came under the control of the villages and village bosses. At the time of the Meiji restoration in 1868 the newly introduced idea of freedom of business, open competition, when applied to fisheries, aggravated the disputes over fishing grounds. The system of fishing rights therefore was continued to facilitate the prevention and settlement of disputes and protect the income and economic welfare of coastal fishing communities. More efficient fishing techniques were restricted in coastal waters to prevent conflicts with traditional operations. The fishery right system that developed was an important factor in preventing disputes among near shore operators, in stabilizing the yield of fisheries dependent on fixed gear, and protecting inshore fishermen against incursions from offshore operators.

In 1884 the government enacted "Working Rules for Fishermen's Associations" in which fisheries management previously operated by the village communities was transferred to fisheries associations. The fishermen's cooperatives came to own the fishery rights, the exercise of which was granted to their members, and coastal fishermen were not allowed to fish unless they were members of a fishermen's cooperative. As Japan approached the economic rigors of World War II, the government in 1941 enacted the "Fisheries Industry Organization Law" as part of its program to establish absolute control over the economy. The traditional fisheries cooperatives became fisheries associations, the prefectural federations became prefectural fisheries associations, the National Fisheries Cooperatives Federation became the Central Fisheries Association, and all characteristics of independent economic organizations were wiped out, being reduced to an organ of the state operated by appointees of the government.

After World War II, measures taken to "democratize" both agriculture and fisheries were directed in large measure to getting the resources, ownership of land and fishery rights, away from large and absentee owners into the hands of the people who actually operated them. The "Fisheries Cooperative Act", enacted at the end of 1948, enabled all the workers in the fishing industry to be members of the cooperatives, whereas the pre-war cooperatives included only heads of families. In addition to their economic activities the cooperatives were given control of fishery rights and representation of fishing interests. In fisheries programs originating at the national level the path followed was National Fisheries Agency - Fisheries Sections of prefectural governments - Fisheries Sections of cities, towns, and villages - Cooperatives.

Between World War I and World War II Japanese fishing operations expanded increasingly out onto the high seas and distant seas stimulated by efforts of the national and prefectural governments to decrease pressure on the coastal fisheries and increase production. To handle the numerous and increasing problems the fishery management system was further developed with the multiple objectives: protect the livelihood of the coastal village population, reconcile conflicts between inshore and offshore fishing operations, prevent excessive competition within a fishery, increase the return on capital, and conservation. The licensing or "permission system" played an important role in these developments. Regulations regarding fishing area and fishing equipment were enacted through ordinances issued by the Ministry of Agriculture and Forestry with the prefectural governors acting in the capacity of national officers in issuing regulations thereunder. These ordinances include limitations on vessel size and horsepower for inshore and offshore fishing, and specification of fishing equipment, fish size, etc. for fisheries extending beyond the boundaries of individual prefectures. The prefectures regulate small and medium trawling (boats up to 15 tons) which includes all dragnetting in the Inland Sea. The National Government (Ministry) licenses boats above 15 tons. The cooperatives operate within the overall regulations issued by the Ministry and the Prefectural authorities. Thus they can, when they consider it desirable, make the system more restrictive but not less; if the resources are declining they may place additional limitations on the fishing season, fishing time, etc.

Under the fishing right-fishing license system, the fishing right represents the exclusive right of the operator to carry out a particular fishing operation in a particular body of water; the fishing license represents permission to operate, together with other licenses operators, a fishing vessel of specified type and gear in a specific fishery. Licensing plays the major role in allocating fishing effort among the various offshore and high seas grounds in order to limit the amount of fishing on each ground and stabilize conditions.

### Rights Fisheries

The right is granted by the Prefectural government (almost always to a cooperative) to use a given area of water. It stipulates the type of fishery and location and area of fishing grounds included, and may establish limitations on fishing time (season) etc. Leasing or mortgaging the right is prohibited, and transfer is strictly limited. The rights are of two types; the first covers fisheries requiring the exclusive use by the operator of a specific water area, while the second covers fisheries in which a number of operators hold rights in common to carry on specified types of fishing in the same specific water area.

The first type includes "set net rights", the right to install a set net of a specific type in a specific location or area, and "demarcated rights", the right to sole use of a specific area for cultivation of marine resources.

The set net right may be operated by the cooperative itself or be leased to a member of the cooperative or to an outsider. Since operation of some of the larger nets may require more capital than the cooperative

or a cooperative member has available, this right often goes to outsiders. The term is for 5 years and the award is based principally on seniority, which in practice means that the lease is renewed on application.

The award of a demarcated right results in a specific area being removed from general use for the season (nori culture) or the year round (pearl culture). Determination as to whether such a right should be granted is based on evaluation of the relationship of the proposed activities to other fishery operations in the area. Which would contribute most to the community? The fishermen's cooperatives have first priority, private individuals second. Pearl culture, because of the capital required, almost always goes to private individuals with priority based on experience and residence.

The second category of rights, covering rights held in common, gives the holder the right to carry on in common with the other holders specified types of fishing in a particular body of water. The right specifies the area, kind of fishing, fishing season, etc. The right runs for 10 years and is held by the local fishermen's association for its members.

#### License Fisheries (Permission Fisheries)

License fisheries cover "designated" high seas fisheries and high seas fisheries in general. Designated fisheries include large scale, high cost fisheries where the impact of intensive fishing on the sustainable yield of the resources is discernable. They include large scale whaling, otter trawling and medium dragnetting (over 50 GT) west of 130° E Long. (East China Sea), high seas salmon and crab fishing (North Pacific), high seas tuna and bonito fishing boats over 100 g.t. (world wide) and certain purse seine fishing.

Licenses for "designated fisheries" are issued by the Ministry (Fishery Agency) and are controlled to promote conservation, discourage over-investment, allocate fishery enterprises between different areas, prevent excessive competition and minimize conflicts among different operators in the same area. The licenses vessels are regulated as to numbers in the specified fishery, tonnage, horsepower, and kind of fishing gear. Decision as to who gets the license technically is based on evaluation of the adequacy of the fishing vessel and the applicant's administrative and financial capacity to carry on the enterprise within the legally defined regulations. However, in practice the issuance of a license in a new or expanding fishery might be used as bait or reward for giving up a license in an overcrowded fishery which the government, because of treaty commitments or other considerations, is seeking to adjust. Behind the scenes also a certain amount of political maneuvering inevitably takes place. Licenses must be renewed each five years but the only criteria for renewal is that the applicant previously held the license. Transfer of licenses is not provided for by law. However, in practice when a vessel is sold, the government cancels the old license and issues a license to the new owner. A license can be secured for a larger vessel if the applicant can arrange to have licenses for smaller vessels of equivalent total tonnage turned in for cancellation. Such arrangements usually involve financial considerations so that a license acquires a value determined in the market place by the size of the vessel



and profitability of the fishery concerned. During the most profitable years of the long line tuna fishery the value of the license was of the same order as the cost of the vessel.

Licenses for other high seas fisheries, where impact of the catch on the sustainable yield is not considered to be an issue, are issued by either the Ministry or prefectural governments. Control of such licensing is primarily for economic and administrative purposes, to discourage over-investment, prevent excessive competition, and minimize conflicts among operators in the same area.

### Free Fisheries

This category covers all fishing not included in rights and license fisheries. These fisheries are subject to regulation by the national and prefectural governments.

### Some Specific Coastal Fisheries

In each of the two principal areas visited I first talked with prefectural and/or city officials to acquaint them with the purpose of my visit and secure background information on the fisheries of the area. Following this I visited several of the principal fishing cooperatives where I talked with officers and members and secured general information on the cooperative and its activities and more detailed information on the principal fisheries in which its members were involved. In the following report I have included descriptions of specific fisheries, such as trawling and aquaculture, under the name of the cooperative from which the bulk of the information was obtained. The discussion of general subjects such as violations, enforcement, and problems of the fishing villages, is based on information obtained from all sources in the prefecture under which the discussion is included.

### Hyogo Prefecture

This prefecture abuts on the Sea of Japan on the north, the Inland Sea on the south, Kyoto and Osaka prefecture on the east and Tottori and Okayama prefectures on the west. The island of Awajishima in the Inland Sea south-east of Osaka is part of Hyogo prefecture.

There are 2300 trawlers licensed in the prefecture. They are of six tons or less with a maximum of 10 h.p. set by the Fishery Agency for the entire Inland Sea. They can fish the year around between 1,000 m. (0.6 mi.) and 6,000 m. (3.7 mi.), measured from straight baselines along the shore. Trawl mesh size and fish size are regulated. Examples: minimum size for tai (sea bream) 10 cm., octopus 100 g.

Awajishima (Hyogo Prefecture) and Osaka Prefecture face each other across Osaka Bay, much of which lies more than 6,000 m. (3.7 mi.) from

either coast. Trawlers of neither prefecture can fish in this area outside of the 6,000 m. zones off their own coasts for such species as sand lance (ikanago) sardines and (akagai), except at such times as have been agreed upon by the representatives of the two prefectures. The times agreed upon for Hyogo boats may not be the same as those for Osaka boats; that is, Hyogo boats may fish in the area at one time and Osaka boats another. Fishermen must stay within the boundaries of their own prefectures except for the operations agreed to under such arrangements.

Sumoto City Located on the east coast of Awajishima.

The fishing area administered by the Sumoto City section of the prefecture extends along the southeast coast of Awajishima, an island some 33 mi. long and 17 mi. wide, a distance of about 30 km (19 mi.) and offshore to the marine boundaries of Osaka and Wakayama prefectures whose coasts are 5-20 mi. distant. Within the Sumoto area there are five fishery cooperatives covering different areas or types of fisheries.

Yura Village (within the Sumoto area)

There are three cooperatives in Yura with a total membership of 1100 fishermen and 363 boats. Two of these include, primarily, boats engaged in trawling and netting while the third involves line fishing, hand lines, set lines, and trolling. The rights for aquaculture (fish, seaweed, and pearls) are held jointly by the three cooperatives which share in the income from the leasing of these rights.

The total income of the three cooperatives during the past year was about ¥ 500,000,000 (\$1,400,000).

West Yura Fishing Cooperative

Membership consists of 238 fishermen including 8 processors. All crew members belong to the cooperative and all have a vote. There are 40 trawlers averaging 4 tons (2-6 range) which gross about ¥ 130,000,000 per year (\$360,000) and 65 gill netters of 1-1/2 - 2 tons, which gross about ¥ 70,000,000 (\$195,000) per year. Their principal catch consists of sea bream, shrimp, squid, sea eel, flounder, and trigger fish.

Since only members of the cooperative can engage in boat fishing, recreation fishermen must arrange with the licensed boat fishermen to use their boats and gear. Fishing from shore is the only free fishing.<sup>1</sup>

Trawling

Before World War II coastal trawling with engined boats was prohibited, presumably to protect the operations of non-powered boats and prevent over-

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<sup>1</sup>Later Mr. Toshio Yoshida, Chief of the Fishery Adjustment Section of the National Fishery Cooperative Association, informed me that use of commercial boats is required only for fishing in areas granted to the fishery cooperatives. Sportsmen are opposing any legislation which would broaden this requirement. Also there are some free areas for sportsmen where no license is required.

fishing. During the war, in the interest of alleviating food shortages, trawling with engines and two-boat trawling was permitted and a shift to larger boats encouraged. Immediately after the war, with repatriation of Japanese fishermen from former overseas possessions, fishing intensity was further increased with consequent overfishing of the resources. Enforcement of licensing requirements lagged during this period. Later, in an attempt to get control of the situation, the prefecture enforced licensing of all boats used in coastal fishing and through subsidies encouraged a shift to smaller boats. The prefecture since then has been endeavoring to reduce the number of boats. Although it is general practice in Japan for a license to be issued to the new owner when a boat is sold, this is not permitted in this prefecture. Further, a license is not renewed if a boat is not fishing or if a son does not choose to take it fishing when his father retires. However, the owner of a license is allowed to substitute another boat under the same license if it meets the size and gear requirements. Under this regime the number of boats has been reduced about 10% in the past twenty years. The cooperative members are in full agreement with the prefecture's program to reduce the number of licenses in this way.

The prefecture also has been seeking greater efficiency in operations and reduction in fishing intensity by encouraging a shift from hot bulb engines to full diesels (which have lower fuel consumption and can be operated from deck controls thus permitting smaller crews) and from trawling to fish culture. The trawler fishermen oppose the shift to full diesels because the rated 10 h.p. hot bulb engines are the equivalent for trawling to about 30 h.p., while the rated 10 h.p. full diesels are equivalent to only 15 h.p. Mr. Kashimoto, president of the association and a top trawler fisherman, believed that the prefecture, in pressing for the lower effective horsepower, is ignoring the special requirements of the area that result from strong currents and varying depths. The Fishery Agency sets an overall limit of 10 h.p. for the Inland Sea, but Osaka prefecture, abutting Hyogo prefecture on the north, allows 15 h.p. for full diesels. The controversial issue was to be resolved early in 1970 by a committee made up of representatives of the national government, the prefecture and the cooperative. Crew sizes on the trawlers at present range between two and four. This is about one-half the number used ten years ago.

The reduction in number of boats and size of crews has been largely balanced by improved gear and fishing technique, so that fishing capacity still is too great and the resources continue to decline. However, neither Kashimoto or other individuals present appeared to have any solution in mind different from the course now being followed. I suggested the possibility of buying up and retiring licenses. This would reduce the fishing intensity and benefit all the remaining license holders. Kashimoto replied that under the conditions he knows this would be unthinkable. The fishermen have no other means of making a living. However, he conceded that if the price offered were high enough the license holder (boat owner) might sell. He estimated that a trawler is worth about ¥ 2,500,000 (\$7,000). If the owner were offered 5-10 million yen he might sell. He did not consider there was much incentive for trawler owners to combine to buy out license holders and retire their boats, even though such action were made permissible, since a reduction of one or two boats would have little effect on the catches of the remainder. Another time I raised the question of benefits such as increased catch per unit of effort and decreased costs

which might be achieved by decreasing fishing intensity, as by laying over 4 or 5 days between trips. Kashimoto replied that economic pressure forced them to fish whenever possible. This amounted to some 280 days a year.

#### East Yura Fishing Cooperative

Membership of this cooperative totalled 350 with annual production worth about ¥ 150,000,000 (\$420,000). This included: 17 trawlers (license fishery) averaging 4.5 tons with 2-3 crew members, catching principally shrimp, sea bream, flounders, shellfish, (hanago) and sea eel (hanno), worth about ¥ 24,000,000 (\$67,000) annually; 25 spear fishing boats (rights fishery) 1.0-1.5 tons with 2 crew members, taking principally abalone, sea urchin and octopus, worth about ¥ 10,000,000 (\$28,000) annually; 18 bottom long liners (common fishery) averaging 4-1/2 tons with 4 crew members catching principally eels, sea bream and puffer, worth about ¥ 55,000,000 (\$153,000) annually; and 190 handliners (common fishery) of 1-1/2 to 2 tons and crews of one catching principally sea bream, mackerel, cutlass fish and flounder, worth ¥ 50,000,000 (\$140,000) annually. In addition there was a limited amount of aquaculture including nori (seaweed), small yellow-tail (hamaji), and pearl oysters.

#### Aquaculture - fish, shellfish and seaweed culture.

Hamaji (small yellowtail) are raised in pens of netting and pearl oysters are grown between frames or wire netting suspended from rafts. Both require relatively calm waters so this culture is confined to the protected waters found in small bays. The Yura coastline generally is open and the culture of these forms therefore quite limited. Leases of areas for hamaji culture run from 3 to 10 years. The hamaji grow from 100 grams to 1 kilogram in 5 to 6 months. Leases for pearl culture run for 10 years. Marketable pearls are produced in 1 to 3 years.

Leases of fish culture rights can be secured by non-member individuals or companies which have the capital to operate. These rights for the Yura area, like those for nori culture, are held and administered by the Yura cooperatives and the fees paid by the users are divided among the cooperatives.

The lease for a new operation generally runs for 1 or 2 years. If the operation survives it might be renewed for a 3 year period and once established the period would be lengthened to 10 years. Lease renewals generally are negotiated a year before the old lease expires to permit time for closing out the operation if the lease is not renewed. Leases usually are renewed if desired by the lessee with the annual payments related to the profitability of the operation. Leases cannot be transferred. In a new operation (lease) the highest bid generally prevails. When there is more than one applicant for a lease which is due to expire, the applicant with the most experience and best plans gets the priority (normally this would be the current lease holder). If a new applicant bids substantially more than the current holder, the latter would be given the opportunity to raise his offer, and other things being reasonably equal he would get the preference. However, if the new applicant offered substantially more (say 5 to 10 times), he might win out over experience.

Pearl culture rights originating in past years stem directly from the prefecture but any expansion in area must be approved by the appropriate cooperative. All new applicants must go to the cooperatives. The Mikimoto pearl culture enterprise operates like a cooperative, i.e. it is leased and supervised directly by the prefecture.

The members of both the Yura cooperatives visited considered that political influence and "presentos" were not factors in determining who got the lease. Long tradition and moral values worked against influence manipulation. It might be that a more profound study of this issue would find some indication of influence but apparently it is not an important factor.

The cooperatives make no payments to the government for the rights which they administer. Taxes are levied on property, buildings, etc. but not on boats. The cooperative pays a tax on earnings and members pay income taxes.

### Nori Culture

Nori is a variety of seaweed grown on brush or netting set out in rows in shallow water. At low tide the rows have something of the appearance of a vineyard. In recent years artificial culture of the spores has been developed.

Use of nori culture rights in the Yura area can be secured only by members of Yura cooperatives, can be granted only by the Yura cooperatives, and the fees paid by the right users are divided among these cooperatives.

An individual member or group of members applies to the cooperative for the right to set up a nori culture operation in a specific area. The cooperative considers the impact of such use of the area on other fisheries. If it concludes that such an operation makes best use of the area, it applies to the Prefecture. If the Prefecture approves, the cooperative is authorized to administer the operation. The time (season of the year) when an area is used for nori culture must be consistent with the nori reproductive and growth season. To the extent practicable this use of the area is adjusted to minimize any conflicts with fishing activities in the area.

### Violations and Enforcement of Regulations

The fishermen present considered the violation of the 1,000-6,000 m. trawling zone (illegal trawling inside or outside of this zone) to be one cause of the decreasing resources. The prefecture and city have patrol boats, but enforcement depends primarily on the fisherman whose interests are affected. It is his responsibility to report violations to the cooperative. Most violations are handled within the cooperative (when both parties are members) or between the cooperatives whose members are involved. Settlements usually are through payments to reimburse losses. When the violations are serious, licenses can be cancelled. Conflicts between line and net fishermen from different cooperatives are resolved by discussion between the cooperatives to determine the places and times for each gear to operate. Problems may be taken to the courts but because of the time required, delays and costs involved, this rarely is done.

## Problems of the Fishing Village

The economic conditions in the village which caused young people to leave for the cities to secure better conditions (opportunities) for employment was the subject of some discussion. One result of the trend to the cities is that the average age of the fishermen in the village is increasing. Attempts were being made to counter the drift by improving incomes through increased mechanization of fishing operations which made it possible to use smaller crews, and developing supplemental fish culture operations during the slack trawling season.

The number of fishermen is slowly declining as the young people leave for better opportunities in the industrialized areas. However, this decline is not fast enough to compensate for the improvements in efficiency of operation. Kashimoto concluded that his cooperative had more members than it needed for the resources it administered, but he had no solution for the problem. The economic consequences were magnified by the annual variations in catches which prevented the most efficient operations.

The resources and catches continue to decline, compensated to some extent by higher prices for the catch. The average income has increased substantially but the cost of living also has increased. Families now are smaller, 2 to 3 children compared to 6 to 8 in the past. The fishermen's living conditions are comparable to those of the farmers, but the farmer has an advantage inasmuch as he can take supplemental work while his wife and children do most of the farm work. Income of city workers is higher than for fishermen but the living standards are comparable.

All agreed that the problem of ocean pollution was increasing, but we did not get into the question as to what if any remedial action was being taken or contemplated. Potentially this would appear to be a problem for Japan even greater than for the U.S. as Japan rapidly develops as an industrial society. Population density is much greater, particularly in the coastal areas where most of the population is concentrated, and the amount of non-usable waste (metal and plastic containers, sewage, etc.) is rapidly increasing. Impact on the intensive coastal fisheries is bound to escalate rapidly.

At the conclusion of discussion with representatives of the two Yura cooperatives, Mr. Harada, Expert Engineer, Marine Branch, Sumoto Agriculture and Forestry Office of the prefectural government, remarked that the information we had been given only scratched the surface of the administrative, enforcement, and other problems found in the fisheries.

## Fukui Prefecture

Fukui prefecture faces on the Sea of Japan just north of Kyoto. It is bounded on the east by Ishikawa prefecture, on the west by Kyoto prefecture and on the south by Kyoto, Shiga, and Gifu prefectures.

### Obama

Obama lies at the head of Wakasa Bay on the Sea of Japan about 54 km. (34 mi.) north of Kyoto as the crow flies. It took us five hours to make the trip from Kyoto to Obama through rugged mountain country on one of the last of the steam powered trains, which stopped at each village along the way. Later we found that by changing express trains a couple of times we might have made the trip in a fraction of this time.

The Obama fishing area, if scaled along a straight baseline, would measure 12-15 miles. However, it includes two bays which stretch the coastline to at least 35 miles. There are five fishery cooperatives in this area, one whose principal operations are one-boat trawling (Danish seining or snurrevad) and other licensed fishing, while the other four principally cover rights fisheries.

The "license fishing" cooperative has 627 members and includes 354 boats. The annual catch has a value of about ¥ 290,000,000 (\$810,000). This cooperative includes the following:

Twenty-four one-boat trawlers of 7-14 tons and crews of 5-6 whose catch is principally sea bream, flounders and mackerel with an annual value of about ¥ 112,600,000 (\$310,000).

Four purse seiners of 65-75 tons. Each purse seine fleet, including the purse seiner, fish carrier, and small boats, has a total crew of about 45. Their catch is principally mackerel, sardines, and horse mackerel (aji) with an annual value of ¥ 81,200,000 (\$225,000).

Forty long line boats of 3-5 tons and crews of 2-3 men. Their catch is principally several species of sea bream with an annual value of ¥ 22,500,000 (\$63,000).

Forty-five gill netters of 3-5 tons and crews of 2 men. Their catch consists chiefly of sea bream, kochi and mebachi (shriayo?) with an annual value of ¥ 14,400,000 (\$40,000).

Two large set nets (daibo ami) which require licenses as well as being classed as "right" fisheries. They have crews of 35 men each and catch principally yellowtail, sea bream, and spear fish with an annual value of ¥ 56,100,000 (\$156,000). The set net summer season runs from April-October, the winter season from September-February. The licenses for summer and winter nets are held by different parties.

There are ten other kinds of gear of lesser importance which are included in this cooperative. The total production of the cooperative had an

annual value of about ¥ 440,000,000 (\$1,220,000). Except for the set nets, all of the fishing operations are in outside waters (outside 1,000 m.).

The other four cooperatives in the Obama area primarily cover right fisheries. One covers fishing for octopus, sea urchin and kelp. Another covers operation of small gill and set nets close to shore. Another covers beach seining (jibiki aml), while the fourth covers culture of nori (sea-weed), fish, and pearls.

### Hyuga

Hyuga is a fishing village east of Obama crowded around the edge of an almost totally enclosed salt water lake of 100 hectares (about 250 acres) and 2.5 mi. circumference. The cooperative has 232 members including 19 involved in aquaculture of various kinds. The operations of the cooperative included the following: two large, three medium, and two small set nets with crews ranging from 50 for each of the large nets to 2 for the small. These nets take mainly large and small yellowtail (buri and hamaji) mackerel, spanish mackerel (sawara) and swordfish, worth about ¥ 70,000,000 (\$195,000) annually. In addition there are a number of fisheries using small boats of around 2 tons with crews of one or two men. Two of these, gill netting and octopus traps, are "license" fisheries while the others using hand lines and long lines are "rights" (common) fisheries. A total of some 80 boats are involved in one or more of these part time fisheries which produce a catch with an annual value of ¥ 90,000,000 (\$222,000). Other "common fisheries" are shellfish (abalone, sea urchins) and seaweed collection with an annual value of some ¥ 20,000,000 (\$56,000). Tourists provide an increasing source of income on summer weekends. Boat rental for this purpose is ¥ 6,000 per day.

### Fish Culture (Rights Fisheries)

The salt water lake contained 140 rearing pens each 9m x 9m (about 91 sq. yds.) operated by 10 persons each with the lease for one or more pens. Species produced included yellowtail (3 sizes, hamaji-small, warassa-medium, and buri-large), sea bream, puffer and octopus. Production was concentrated principally on sea bream (15 pens), puffer (15 pens) and yellowtail (110 pens). Total annual value of production was ¥ 41,000,000 (\$114,000). The products go principally to the Kyoto-Osaka sashimi market in December when sea production is low and prices consequently high. The quoted prices per kilo were--sea bream ¥ 1800-2000 (\$2.30-\$2.50 per pound), puffer ¥ 1700-2000 (\$2.10-\$2.50 per pound), yellowtail running from ¥ 100-500 (\$.13-\$0.63 per pound) for small to ¥ 700-1000 (\$.88-\$1.26 per pound) for large. Present production of the lake was considered the maximum it would support.

Yellowtail fry used in the fish culture operations are purchased from set net and hand line fishermen in June. They then weigh about 100 g. each and cost ¥ 20 (1/2 cent). By December they reach 1 kg. and bring ¥ 400-500 each (\$1.10-\$1.40). They are fed chiefly small mackerel, mackerel pike, and scrap fish. This requires some 7-8 kilo per fish and costs the operator ¥ 250-300 (\$.70-\$0.83). Small mackerel and mackerel pike used for feeding, which during the past summer cost ¥ 15 per kilo, now (October) cost ¥ 500-600 per kilo (\$.63-\$0.83 per pound). We were informed that fish produced in this way have fewer bones and secure a 30% price premium over



wild fish. This lake has some mixture of fresh water which helps control disease. Other nearby areas more open to the sea and therefore of higher salinity, have a higher infestation (worms) which makes them unsuitable for fish culture.

The 19 members of the cooperative involved with fish culture operate individually, each having the right for between one and ten pens. The location of his pens is decided by lottery every other year and the annual rent paid to the cooperative is decided by the cooperative on the basis of location of the pens.

Each year's stock of fish is sold out in December and applications for the next year's locations filed in January. Members of the cooperative have priority in securing the rights. If more than 19 persons apply, the number of pens (locations) per individual would be reduced. Fish culture here in the Hyuga area began 15 years ago. The biggest danger to these operations is from typhoons.

The fish culture rights allotted to the cooperatives by the prefecture have a duration of 5 years but the rights leased by the cooperative to individuals run for only one year.

#### The License Fisheries

The National government establishes the basic regulations. The prefecture may modify these regulations to make them more stringent but not less.

The National government licenses boats over 15 tons, establishes the maximum horse power allowed for each size of boat (this averages about 6 times the tonnage), and the total tonnage of boats allowed in each of the two categories (above and below 15 tons). The prefectural government licenses boats up to 15 tons. All trawlers must fish outside of a 10 mile zone measured from straight baselines along the coast and within the boundary extensions of the prefecture in which they are licensed. Prefectures may work out arrangements with adjacent prefectures to permit fishing in each other's waters on some agreed upon basis. Fukuoka prefecture has a trawling season from September 1 to May 31. In order to prevent use of lights no night fishing is allowed. The prefecture establishes minimum mesh sizes, fish sizes, etc.

Licenses apply to both the boat and owner. It is relatively easy to secure from the prefectural government an upgrading in boat size to 15 tons by turning in licenses for boats whose tonnage totals at least that applied for. However, licenses for more than 15 tons are issued by the National government and must come within the total tonnage limits (quota) set for these larger boats. This quota is not helped by turning in tonnage in the under 15 ton category administered by the Prefectural government. The licenses run for 3 years and are automatically renewed. The fishermen and prefectural people I talked with considered that influence, political and otherwise, had little effect in the awarding of licenses. Historical use is the dominant factor in renewing licenses. Since the present objective is to reduce, not increase, the number of licenses a new one is not issued when an old license lapses. It was conceded that since the number of licenses

was established by the National government, a person of great influence might be able to persuade the government to increase the total number of licenses and thus make one available. Apparently the possibility of persuading a government official in one way or another to refuse to renew one man's license and make it available to another was not of sufficient substance to merit even a comment.

Inquiry as to the basis for determining the number of boats (total tonnage) to be licensed brought out comments regarding conservation (extent of resources), efficiency of operations, and adequate income per operator. Quite likely in the coastal fisheries this question is, and during the post war years has been, academic. Some twenty years ago when the present management system was established, the existing excessive trawling fleet was blanketed in and licensed for the primary reason that there was nowhere else that they could go fishing and practically nothing else that they could do to earn a living. Since then both the national and prefectural governments have been striving to reduce this excessive fishing pressure in coastal waters by encouraging (by subsidies, etc.) a shift to bigger boats which would fish further offshore. It was the view in Obama that this increased fishing pressure on offshore stocks would have no adverse effect on these stocks. The fishing pressure off this coast still was low. Increased Soviet fishing was to be found further northeast and Korean fishing further southwest. There were conflicting theories to explain the serious decline in mackerel catches in the Obama area. Some thought that changing water conditions caused the mackerel to move further offshore. There was no reference to increased mackerel fishing to the southwest by foreign fishermen.

There was some discussion of the impact of decreasing resources and increased costs on the fisheries in this area. During the past 20 years the number of trawlers had decreased about 1/3, purse seiners have decreased from 30 to 15, primarily because of the decline in the mackerel stocks, and the number of set nets, which depended mainly on catches of yellowtail, has greatly decreased. The number of small one man boats was increasing. Trawling was not profitable because of the increased cost of labor and materials. The same was true for set nets.

It was considered practically unthinkable for the prefecture to consider reduction of the excessive fishing pressure by other than voluntary reduction in the number of boats. Other measures being taken by the prefecture to meet the fishing problem included studies to evaluate the current condition of the resources and of the potential capacity of possible new fisheries and encouragement of further development of fish and seaweed culture.

#### Problems of the Fishing Communities

I inquired regarding the impact on the future of the coastal fishing communities of the higher wages and other attractions of the cities for the young people. They conceded that more people were moving to the cities. This problem is being worked on at national, prefectural and local levels. They are trying to improve fishing methods and the economics of fishing, provide subsidies for larger boats which would fish farther offshore, combine cooperatives to form larger units, improve living conditions in the villages and stimulate local interest in these developments.

## Violations and Enforcement of Prohibited Areas

The prefecture patrols the fishing areas. If a boat is caught in violation it may be fined and/or ordered to stay in port for a specified period. There is no provision for cancelling the license. If a boat from one cooperative sees a boat from another cooperative in a prohibited area it reports to the prefecture. The best evidence of violation would be for the prefecture official to catch the violator in the prohibited zone. Other good evidence would be a picture of the violator showing an identifiable location. Inquiry failed to reveal any more unique procedures for assuring area enforcement.

### Miyagi Prefecture

#### Sendai

In a rather brief meeting with Prefectural fishery officials, I secured some information regarding recreational fishing, aquaculture and treatment of fishery rights in this prefecture. Sport fishing is limited by the Prefectural government to lead line, casting, and spear fishing. Fish and seaweed culture, collection of seaweed, and set nets are not open to recreation fishermen. All of these require the exclusive use by an individual or group of a specific water area (characteristics of "right" fisheries). If a cooperative wishes to expand its area of operation it can request an increased area from the Prefectural government. If a large area is involved, the request must go to the National government. In principle the fisheries are open to all, but actually about 80% are under license or "rights".

All aquaculture fisheries come under the cooperatives which lease the rights with first priority going to members. There is no procedure in Japan under which one operator can expand his operations through buying out another. This is not possible under present laws which appear to be based on the conclusion that such procedures are "undemocratic". (This is the age of Democracy.)

In situations where requirements for city expansion or public recreation conflict with existing rights of a fishery cooperative, the city or promoter can pay the cooperative to give up its right to the area. Such payments generally approximate the equivalent of ten years earnings from the right being given up.

### General Remarks

#### Permanence of Leases and Licenses

The information on both the rights fisheries and license fisheries indicates that in nearly all circumstances the leases of rights and the licenses are renewed almost automatically as long as the holder desires to continue operating. This is done in spite of the recognized desirability to reduce fishing pressure. The grantor - National government, Prefectural government or cooperative - by subsidies or other measures may seek to per-

suade the leasee to shift to another fishery or withdraw, but apparently he is never forced to relinquish his lease or license. Yet all of the leases or licenses are for limited specified periods. I inquired of Mr. Ando, President of the National Association of Fishery Cooperatives, regarding the necessity for these limitations, why not give the rights continuing quasi-property status to allow some flexibility for transfer and adjustment, as has been done unofficially with licenses for high seas fisheries. Mr. Ando replied that the fishery resources were common property, belonging to all the people. Placing a limited time period on leases and licenses allowed all eligible fishermen to periodically apply for such leases and licenses. I did not have an opportunity to follow up this subject and the philosophy behind Mr. Ando's answer. Since in practice the opportunity to apply rarely brought results, it would appear to be a philosophical more than pragmatic consideration.

### The Current Role of Aquaculture

The Ministry and Prefectural officials are vigorously encouraging the development of aquaculture for full time or supplemental employment and income. This is being actively pursued, particularly in areas close to the major quality markets such as Tokyo, Hyoto and Osaka, where premium prices are paid for live or ultra fresh fish and shrimp for the sashimi and ebi tempura trade. Except for Dr. Fujinaga's enterprises on shrimp and Dr. Imai's on shellfish, the commercial operations depend on natural reproduction for their supplies of young and mostly on low cost fish for feeding. I did not hear any optimistic predictions regarding the near term potentials of aquaculture for producing medium and low cost fish.

## Discussion

In my evaluation of the Japanese fishery management system, two things stand out. First, the fishing rights and licenses have provided a means for controlling and directing fishing pressure on the coastal aquatic resources, protecting the local fishermen and fishing communities from being impoverished by outside operators, and limiting (although not fully preventing) overfishing these resources in spite of intense population pressure. This detailed management of individual species, many with different but often overlapping distributions, has involved innumerable administrative problems, most of them local. The second characteristic of the Japanese system, the Fishing Cooperatives, has provided an effective and sensitive means of handling these numerous problems without requiring a massive government bureaucracy. In a sense the cooperatives have ownership of the fishery resources in their areas of jurisdiction and these they manage in the best interest of the membership, subject to requirements of the National and Prefectural governments concerned with protecting the public interest and managing resources which range beyond the jurisdiction of the local cooperatives. This setup allows the cooperatives to handle a great many of the problems of regulation and enforcement that otherwise would devolve upon government.

During the post World War II years that the present system has been operating, it has been faced with an overriding problem which it inherited from the past, a problem which it has not been able to resolve; that of too many fishermen for the resources available. Since the system has no mechanism through which the excess of fishermen can be reduced (save slow attrition), it was forced to direct its attention primarily to maintaining the division of fishing opportunity among all those who were historically involved while doing its best to maintain the productivity of the resources. Decisions between maintenance of employment and maintenance of productivity of fish stocks have been decided in favor of maintained employment, for in the fishing villages there was little else to do for a living. The end result, however, has been a continued decline in the yield of the resources while production costs have been increased by the excessive gear and fuel requirements. Thus the gross and particularly the net returns to the community have been reduced.

The dramatic development of Japanese industry during these years has attracted many young people from the fishing villages to the cities and industrialized area. However, judging by the evidence from the fishing areas we visited, the reduced manpower in the villages has been balanced by increased efficiency of fishing operations so there still are too many fishermen and fish stocks continue to decline. It would seem likely that under the present philosophy the downward trend in the resources will continue and the fishing villages will continue to shrink until some minimum equilibrium is reached between resources and manpower. At this equilibrium level the resources will fall far short of making their optimum contribution to society in terms of either biological or economic yield.

Is there some practical way by which better use can be made of the marine resources, some realistic management strategy which will promote progress toward optimum yields? To increase the economic yield requires

higher prices per unit of product or reduced cost per unit of product. Increase in prices is restrained by consumer resistance and imports from lower cost countries. Reduced cost per unit of product can be achieved by securing a larger catch per unit of effort or by taking the present catch with less effort. The first, a larger catch per unit of effort, can be achieved if the standing stock, that is the quantity of fish on the grounds in terms of weight, is increased. This objective will be promoted through measures to maximize the yield per recruit by protecting small fish where the rate of growth exceeds natural mortality, and by reducing the fishing intensity through annual limits on the catch or on fishing effort. The second, taking the present catch with less fishing effort, can be promoted by using more efficient fishing gear, in terms of kind or size. In either case such measures would result in decreasing the manpower requirements, at least temporarily, and there's the rub. Under the management system in practice, management has been committed to sharing the limited and declining returns among all those who historically participated in the fishery, rather than to maximizing either the economic or biological yields. In effect it is a "share the work" program and where other work was limited or non-existent perhaps this was a necessary objective. However, in theory at least the village would have been better off economically if the optimum economic returns had been achieved and the earnings divided among all members of the village. The rights and license system has been successful in preventing the influx of additional manpower into the coastal fisheries and it has provided for distribution of fishing opportunity among those already there, but it has not provided the means for optimum use of the resources.

Perhaps I should add here that to my knowledge no other system in use for managing the coastal fisheries provides the means for optimum use. The Japanese system comes closer to this objective than any other of which I have knowledge.

With the recent and continuing economic development of Japan and the resulting new job opportunities, it should be worthwhile to consider how the present "share the work" management of coastal fisheries might be modified toward a more flexible competitive system, one more comparable to that which has been basic to Japan's dynamic economic growth and which will make better use of the marine resources by promoting the development of optimum returns.

As concluded above, measures to bring substantial improvements in the economic yields and probably in biological yields, will require decreasing the number of fishermen. Action directed to this end might be taken by government edict but this would immediately or later involve economic and social determinations, such as the level to which fisheries income should be raised by government control as compared to incomes in adjacent and competitive industries. Such decisions surely would become heavily involved in politics and heavily influenced by politics, and it is likely the objectives of the management program presently would be more or less subverted by politics.

An alternative approach, and one more consistent with the economic philosophy of other industries, would be to develop the rights-license system a step beyond its present range. For example, let us take a license fishery involving a stock of fish found in Japanese coastal waters and subject to exploitation by Japanese fishermen only. Under the present system licenses can be bought and sold (at least in some fisheries) and

there is some flexibility for developing the most efficient size of vessel through the unofficial procedure for purchase and sale of licenses and limitation of the fleet by total tonnage rather than by number of boats. Let us assume that this group of license holders, acting as a cooperative or association, establishes limits on the number of days in the week, or weeks in the year, that boats can fish. If the stock had been overfished (as is true for most Japanese coastal stocks) this would permit some increased growth of individual fish and therefore some increase in the yield per recruit. It would also permit some increase in the standing stock. Both of these developments would increase the catch per unit of effort. The reduced costs of operation through savings in fuel and gear with the reduced fishing time and the increase in catch per unit of effort would increase the net economic yield, an objective we are seeking.

Why are such steps not taken? I expect first, there is the conviction inherited from generations of hard working fishermen, that a poor fisherman cannot afford to be idle, and second, the fishermen, from long association with the "share the work" philosophy, believe that if this fishery should become much more profitable than others in the region, the number of licenses would be increased so each man's share would be about the same as it was before the agreement to cut back fishing effort. So why risk temporary reduction in catch or earnings? It would seem likely that if the current license holders could be sure that increases in the net economic yield would accrue to them through increased annual returns per boat and higher value of their licenses, they could in time be persuaded to support measures such as those suggested to increase the yield per unit of effort and reduce the cost per unit of yield.

A situation involving control of fishing effort, such as has been outlined, would suggest a further development. As fishing methods and gear increased in efficiency the amount of fishing time should be decreased and the required layover in port of the licenses fleet would increase. At some point it would become clear to the license owners that if there were fewer boats the fishing time of the remainder could be increased and the boats and gear thus more efficiently utilized with a corresponding increase in net returns. Since every fishing license would have a value based on the profitability of the fishery, and the fishing success (and desire to continue fishing) of the owners would vary, it seems inevitable that at some point the association would decide to buy out some of the less successful and dedicated license holders (those who would sell their license for the lowest price) and retire the licenses. The net returns of the remaining license holders thereby would be increased. This process of reduction in licenses would be a gradual one, thus providing time for the bought out license holders to adjust to other employment and find productive ways to use the money received for their retired licenses. The retirement from fishing would be by individual choice not by government coercion.

It would not require a very great modification of the present Japanese system to give the license holders the authority to take steps such as have been suggested. This move should be much more acceptable now than in the past, for alternative opportunities for employment are developing in the fishing localities or elsewhere. The suggested procedures would not result in abrupt changes from the present situation; they would provide economic

Incentives for moving toward more efficient management of fisheries production which should lead toward maximization of the economic yield and help the coastal fisheries survive as important industries in competition with other domestic foods and imports.

Administration of such a system will involve many complexities because of the different but often overlapping distributions of the different stocks of fish and the multiple uses of the marine areas. However, Japan's system of fishing rights, licenses and cooperatives, and her experience in administering this system in the intensive coastal fisheries through the interlocking activities of the national and prefectural governments and fishing cooperatives, gives her an impressive start on an incentive system that can move toward optimum returns from the marine resources.

In the Introduction I stated that "the indirect purpose of this project was to examine whether any features of the Japanese system (of fishery management) might directly or with modifications be useful in our attempts in the U.S. to work out and apply more effective procedures for managing U.S. fishery resources".

I would now like to restate this in the form of the question: What can we learn from the Japanese experience that would be useful in developing an effective system for the U.S.?

The following appear to me to be the principal lessons.

1. It is possible to manage with some success the multiple living resources in the coastal areas with their varied and overlapping distributions, by a system of fishing rights and licenses.
2. Local associations of users, such as the fishing cooperatives, operating under the supervision of government agencies concerned with the public interest and with resources extending beyond the range of the fishing associations, can perform a very useful, perhaps essential, part in the management system. Motivated by the interest of their members in maximizing the returns from the resources these organizations can assume the responsibility for much of the detailed management measures and the enforcement of such measures.
3. A limited entry system, such as the Japanese fishing right-fishing license complex, without some form of continuing individual or group property right subject to purchase and sale is likely to perform as a "share-the-work" system rather than as a system for management of the resources for optimum economic or biological yields.



