

The Theory and Practice of International Fisheries Commissions and Bodies

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Abstract

During the 20th century a variety of organizations has been developed among the community of nations to deal with international aspects of fishery conservation. Seven types of such organizations, comprising about twenty-four bodies, councils and commissions, are discussed and a subjective evaluation of their success or failure given.

The rapid increase of fishing effort on a world-wide basis is creating new problems of fishery conservation in the world ocean more rapidly than the means for their solution is being created. In particular, funding for the research required in identifying international fishery conservation problems and devising solutions to them is not keeping pace with the rapid increase and diffusion of fishing effort.

Responsibility for fishery affairs in the United States Government is so diffused among its agencies that it has been unable to accommodate into its foreign policies and activities the rapid growth of its fishing industry into the foreign field. It, the Soviet Union, Japan and the countries of western Europe are not providing the research funding required to evaluate the effects of their fishing activities on world ocean fish stocks. The result is an increased wastage of fishing effort, growing wastage of resources through overfishing, and increasing disputes over fishery jurisdiction on the high seas. This is likely to increase sharply.

INTRODUCTION

DISPUTES AMONG NATIONS arising from problems of jurisdiction over fisheries are not new. They have had a powerful and continuing effect on the formation of the modern Law of the Sea at least from the sixteenth century to the present (Heinzen, 1959). History records numerous interactions arising among European nations out of the fisheries of the North Sea and Baltic Sea particularly. These disputes, as did many others, followed the Europeans to the New World and international law was further shaped by arbitrations of fishery disputes arising from the Grand Bank and Bering Sea Fisheries during the nineteenth century (Tomasevich, 1943).

For a very long while, in terms of modern history, the roots for such disputes were to be found principally in attempts to gain, or retain, special privileges for one national group over another in a particular fishery. This is still a root cause for controversy among nations over fisheries, but as global communication has improved so that world opinion can be rallied rather quickly on issues affecting the general peace, it has become increasingly difficult for one nation to move unilaterally to effectively exclude, or hamper the operations of fishermen of other nations in the high seas simply to gain preferential advantage in that fishery for its own nationals. Such actions tend to give the offending nation a bad international public image.

The idea of conservation, and the necessity to limit fishing effort to prevent over-fishing, also is not new to this century. As early as 1278 in England the regulation of fisheries more or less for this purpose was being practiced (Graham, 1956). At about the turn of the nineteenth century opinion among marine scientists began to crystalize along the lines that the regulation of fishing effort would, under certain circumstances, produce more fish with less effort from a particular fishery than would unregulated fishing effort (Peterson, 1894). The first mathematical model of the relationship between the vital processes of the fish population and the yield of the fishery was published by Baranov in 1918 (Baranov, 1918).

During the next twenty years thinking and experience concerning the conservation of high seas fisheries was materially extended by such scientists as Russell (1931) and Graham (1935 and 1939) in England, Hjort and others (1933) in Norway, and Thompson and Bell (1934) in North America. Shortly after the end of World War II the spurt forward in fishing effort on the sea led to sharply expanded scientific study of these questions and extension and improvement of the mathematical theory originated by Baranov in the North-east Atlantic area (Hulme, Beverton and Holt, 1947), in the tropical Eastern Pacific (Schaefer, 1956 a and b, et sequel); and elsewhere (Ricker, 1954).

The continued expansion of fishing effort led to exacerbated and wide spread interactions over fishery jurisdiction in many parts of the world after 1945. The International Law Commission undertook a study of the whole subject of the Law of the Sea at its first session in 1947 and continued prosecuting that inquiry for the next ten years. This led to the United Nations sponsored "International Technical Conference on the Conservation of the Living Resources of the Sea" in Rome in the spring of 1955, and two United Nations sponsored conferences on the Law of the Sea held in Geneva in 1958 and 1960. (United Nations, 1956, 1958).

There arose from the 1958 conference (United Nations, 1958) four conventions which were opened for ratification and have subsequently come into force. One of these, "Convention on the High Seas," set out the right of all nations to fish on the high seas (Article 2), with the only qualification being that this freedom of fishing should be exercised by all nations with reasonable regard to the interests of other nations in their exercise of the freedom of the High Seas. The companion convention "Convention on Fishing and Conservation of the Living Resources of the High Seas" defined this freedom more specifically in its two initial articles, as follows:

"Article 1

- "1. All States have the right for their nationals to engage in fishing on the high seas, subject (a) to their treaty obligations, (b) to the interests and rights of coastal States as provided for in this convention, and (c) to the provisions contained in the following articles concerning conservation of the living resources of the high seas.
- "2. All States have the duty to adopt, or to cooperate with other States in adopting, such measures for their respective nationals as may be necessary for the conservation of the living resources of the high seas.

"Article 2

"As employed in this Convention, the expression "conservation of the living resources of the high seas" means the aggregate of the measures rendering

possible the optimum sustainable yield from those resources so as to secure a maximum supply of food and other marine products. Conservation programmes should be formulated with a view to securing in the first place a supply of food for human consumption."

Thus within forty years of the time when Baranov had published the mathematical basis for relating fishing pressure to capability of a fish population to produce fish it had become a solemn obligation in international law for nations to practice conservation in their fisheries on resources of the high seas and to cooperate with other nations in doing so.

The commanding position of this notion in international law and practice grew out of cooperation among scientists and the nations in the investigation of fisheries jointly participated in by their nationals, and it demanded such cooperation in the further application of these principles (SCOR, 1967). In essence the entire theory of fishery conservation rose or fell on the accuracy and completeness of statistics, as well as knowledge of certain vital parameters of the particular fish populations. Necessary for this purpose were (a) a definition of the homogeneous fish population under study as to geography of occurrence; (b) the total yield of the fishery by some unit of time, such as a year or fishing season, (c) a measure of the amount of fishing effort used in the capture, (d) the rate of recruitment to the population, (e) the rate of growth of the species, and (f) the rate of mortality of the population (Schaefer, 1956a).

All of the parameters are subject to fluctuations arising either from variations in the environment or in the activity of man. To acquire sufficient precision to be useful in managing the fishery for conservation purposes, several of the statistics needed to be accumulated for a considerable number of years in approximately the same manner. The longer the period of good statistics the more precise would be the estimates of the parameters, and the more useful they would be in interpreting the effect of the fishery on the population under investigation, and its ability to produce.

Although the obligation to conserve high seas fisheries is generally agreeable to the nations (there was no dissent to this principle from the eighty-five nations participating in the Conference on the Law of the Sea in Geneva in 1958) there has not yet been devised any generally agreeable formula as to how the benefits (the fish) accruing from such conservation practices should be divided. Thus the prosecution of high seas fisheries remains one of the more fertile fields for generating disputes and interaction among the nations. (Christy and Scott, 1965).

Two principles have run through the thought and discussion on these problems since Petersen's early paper (1894): (1) the fishery should be regulated to secure the optimum sustainable catch (implying optimizing the economic yield from the fishery) and (2) the fishery should be regulated to secure the maximum sustainable physical yield from the resource in terms of weight of food. The theory on this subject has been developed over the past fifteen years by Gordon (1953, 1954), Turvey (1954), Schaefer (1959), Crutchfield and Zellner (1963). It has been summarized and applied to international fisheries managerial structure recently by Christy and Scott (1965).

In essence, Gordon set out the thesis that economic yield could not be maximized in a fishery on common property resources without limiting entry to it. Schaefer demonstrated that the point of maximum economic yield in a

fishery is always at a lower level of effort and catch than that corresponding to the maximum sustainable physical yield, and indicated some of the decisions that need to be made in picking which of these criteria should be maximized. He demonstrated that the concepts of maximizing net economic yield and maximizing sustainable physical yield from common property fishery resources are mutually exclusive, and thus both cannot be accomplished.

Christy and Scott (1965) have gone forward to advocate a generalization of the Gordon thesis into practice which would include:

- (1) limiting entry into any fishery when this was required to maximize the net economic yield from it.
- (2) since limitation of entry could not be arranged unless the resource (or access to it) was owned by some entity or under its exclusive jurisdiction, each living resource of the high seas should be put under the exclusive jurisdiction of a single managing agency as such treatment is desired.
- (3) because of the excessive mobility of many such resources and other practical problems, the single managing agency should be the United Nations, and to it should be given exclusive management jurisdiction.
- (4) the revenue received by the United Nations from the operation of the world fisheries in this manner would be divided out or used in some manner agreed upon in the United Nations.

Whereas the approach to these problems agreed upon by the nations in the "Convention on Fishing and the Conservation of the Living Resources of the High Seas" deals almost entirely with the production of wealth from these ocean resources, the approach of Christy and Scott purports to deal simultaneously with the production and *distribution* of this wealth. Chapman, W. M. (1966, and 1967 a and b) has discussed some of the problems involved in the application of the Christy and Scott approach.

Adding to the complexity of this set of problems has been the great emphasis since 1947 in the assistance to countries in the developing world in the development of marine fisheries through FAO and other international and bilateral agencies. Most important of these aids are the Fishery Pre-Development Survey projects supported by the Special Fund of the United Nations and executed by FAO Fisheries Department. The influence of \$105 million is behind 39 such projects, which are in various stages of planning, operation and completion.

The greatest force in all of this has simply been the rapid development of fishing effort on a world-wide basis, which has put continuing strain on the productive capabilities of one after another fish population of the high seas. A good measure of this is the total world catch of fish and non-fish products. In 1850 it was, excluding whales, between 1.5 and 2.0 million metric tons; in 1900, about 4.0 million tons; in 1930 about 10.0 million tons; in 1950 about 20.2 million tons; in 1960, 38.0 million tons; in 1965, 52.4 million tons; and in 1966, 56.8 million metric tons (Moiseev, 1967).

The period of doubling of world catch in the last half of the 19th century covered the period of introduction of the steam engine and the development of the trawl net. The period from 1900 to 1930 marked the increasing use of the internal combustion engine in fishing vessels. The period from 1930 to 1950 included the spreading use of the diesel engine in fishing vessels, the increasing use of ice in chilling fish at sea and the beginning of freezing fish at sea. The

period from 1950 to date has covered the broadened adaptation of freezing at sea as well as other processing in the vessels; the widespread use of synthetic webbing in all sorts of net fishing which, with the power block, has greatly improved the efficiency of purse seining; the introduction of much new technology at sea which has greatly strengthened the economic ability of vessels to range far from home ports for long periods; changes in the business structure supporting fisheries; and the conversion of such ocean commodities as frozen tuna, frozen shrimp, frozen fish blocks and fish meal into truly world products with global markets.

TYPES OF EXISTING INTERNATIONAL FISHERY COMMISSIONS AND BODIES

New technology is now being adapted widely in the fisheries of many countries so that high seas fishing is now the concern of numerous nations. As fishing pressure increases and as new nations become important in ocean fishing, problems requiring international collaboration and cooperation increase (Jackson, 1967). In the past 70 years many forms of international commissions and bodies have been developed to attend to such problems among the nations. Some of these have worked well and are still working well; others have not. The whole subject is presently under study as respecting fisheries bodies as a whole, by the newly established Committee on Fisheries (FAO, 1966b and 1967b); and as affecting all international aspects of man's activities on the ocean by the Secretary General of the United Nations (U.N. Res. 2172 (xxi), 6 Dec. 1966).

There is a general feeling abroad that the present institutions for dealing with international aspects of marine use problems are not adequate to deal with the problems that exist or can be seen as developing with some certainty. It is, perhaps, useful to have a broad, sweeping look at the general sorts of international fisheries commissions and bodies that presently exist, and some general look at their strengths and weaknesses. In the following pages existing institutions of this sort are discussed by general types.

International Commission for the Exploration of the Sea

The oldest of these bodies, the International Council for the Exploration of the Sea (ICES), was inaugurated in 1902. It grew out of informal cooperation among scientists in the countries adjacent to the North Sea and interested in that body of water and its fisheries. The work of this Council over the years may be said to have laid the basis for the new sciences of hydrography and fisheries. It has survived two world wars and is stronger now than it ever has been. It has recently been in the process of reorganizing its affairs under a formal convention negotiated among its members in 1964. To it belong 16 countries of both Eastern and Western Europe. Canada has recently joined and the United States, which belonged but dropped out during World War I, is in the process of joining again. (ICES, 1967).

Certainly ICES has been, and remains, a most successful institution. Its original broad objective "the international investigation of the sea" has remained in force. Although its members are chiefly interested in the Northeast Atlantic and adjacent seas, important studies from other parts of the world ocean, and dealing with fisheries and hydrography elsewhere, appear consistently in its publications.

The Council employs a general secretary and a small scientific and clerical staff who coordinate research and organize meetings, but research within its purview is done by the agencies and laboratories of member nations. Its operations are supported by modest contributions of member governments. It conducts its affairs through committees of national scientists on special topics and on certain areas. It collects and collates fishery statistics and hydrographic information, and publishes the results of investigations.

The Council has not been directly involved with the regulation of fisheries, but it has had an important role in shaping various conventions designed to carry out its recommendations in the North-East Atlantic. These have included (1) a convention for the Baltic negotiated in 1929 among Danzig, Denmark, Germany, Poland and Sweden, in respect of plaice and flounder fisheries, which remained in effect until World War II, (2) a convention of the same sort signed in 1927 among Denmark, Norway and Sweden for the plaice and dab fisheries of the Skagerrak, Kattegat, and Sound; (3) the more broadly important Convention for the Regulation of the Meshes of Fishing Nets and the Size Limits of Fish, negotiated among 12 countries in 1946, but becoming effective in 1954, and, replacing the latter, and (4) the Convention establishing the North-East Atlantic Fisheries Commission, which came into effect in 1962.

This latter Convention differs from some others elsewhere in the world in that it provides for another body, the ICES, rather than the particular Commission it established, to provide the research and research coordination upon which the regulatory Commission acts. A Liaison Committee exists with ICES through which ICES performs these functions for the Commission. This has generally worked to the satisfaction of members.

This bifurcate apparatus of one organization for research and another for regulation has the difficulty in that, like others, it has been so far generally ineffective in bringing about regulations which require limitation of fishing effort. It has devised no way of *distributing* the wealth of the sea that is generally agreeable to its members. The consequence of rapidly increasing fishing effort in the area has been an increase in the number of stocks of fish that are being fished at a level of effort beyond that corresponding either to the maximum net economic yield or the maximum physical yield. There is general agreement, for instance, that if the effort spent on cod and haddock fishing in the area were substantially reduced, the total catch of cod would increase somewhat with corresponding decrease in cost of catch (Meyer, 1967). Since cod and haddock support most important fisheries in the area, inability to deal with such problems gives concern.

ICE's highly satisfactory activity over the years led to the formation of two other councils modeled on it. The first was the International Council for the Scientific Exploration of the Mediterranean Sea, which was organized in 1919. It continues to function but with nowhere near the vigor and vitality of ICES, dealing chiefly with problems in marine science such as hydrography and plant biology and not directly connected with fisheries. The second such body was the North American Council on Fishery Investigations formed in 1920 among Canada, Newfoundland, the United States, and later, France. Its meetings were discontinued in 1938 upon the outbreak of World War II and were not resumed. This Council did have a bearing, however, on the subsequently established International Convention for the Northwest Atlantic Fisheries.

A third body, the West Pacific Fisheries Commission was formed on this model in 1956 by agreement among the Soviet Union, Mainland China, North

Korea and North Viet Nam. In 1958 Mongolia adhered to this agreement. As with ICES the main emphasis is on coordinated investigations of the various stocks of fish, there are no regulatory provisions, and the annual sessions are of a general scientific nature, dealing with specific problems through appropriate sub-committees as conditions warrant. (Mathisen and Bevan, 1967).

Since this form of body is in essence a more or less informal forum in which individual scientists can get together and collaborate, its success is largely dependent upon an active scientific community having common interests in investigating a particular sea area. This condition does not yet exist in many ocean regions.

The Fur Seal Convention

The first international convention designed to attend to the conservation of a marine animal was that signed among Great Britain (for Canada), the United States, Japan and Russia in 1911 to protect the populations of fur seals in the North Pacific, which had been strongly reduced in number by pelagic sealing. It remains a unique example of this particular type of convention.

All members agreed to prohibit pelagic sealing. The United States, in return, undertook to manage the Pribilof Islands seal herds (the largest) and pay Canada and Japan each 15% of the annual harvest. Russia undertook to manage the Commander Island herd and also pay Canada and Japan each 15% of its annual harvest. Japan undertook to manage the Robben Island herd (which had been reduced to only a few animals) and pay Canada and Russia each 10% of its annual harvest. There was no provision for a continuing Commission or for joint or coordinated research. In actuality little such research was done even by the countries directly responsible for the management of the herds. (Scheffer and Todd, 1967).

The reaction of the fur seal herds to this protection was prompt and rapid. By 1916 the Pribilof herd had nearly doubled in size and by 1930 it had increased to about 1.5 million individuals. The convention was successful until in October 1940, Japan notified the other members of its intention to abrogate a year hence, which it did. It did this on the stated grounds that the fur seal herds had increased so much that the objectives of the convention had been fulfilled, and that fur seals were now so numerous that they were adversely affecting the Japanese fisheries. Political tensions in the Pacific area at that time may have had an influence on this action as well, (Herrington and Kask, 1956).

During World War II protection of fur seals in the eastern and northern Pacific was continued under agreement between Canada and the United States. USSR has not engaged in pelagic sealing. Japan, by agreement following the treaty of peace, refrained from pelagic sealing. Finally in 1957, after extensive investigations had been made that assessed the number of fur seals in the North Pacific more precisely and assessed their relationship to the stocks of fish used commercially in the area, the four parties to the original convention concluded a new convention. The new convention continued the main features of the original essentially unchanged, and provided additionally for a continuing Commission which would make such recommendations to the governments as research done by the member governments indicated to be desirable. This Interim Convention of Conservation of North Pacific Fur Seals was extended for another six years in 1963, with only minor modifications (President of the United States, 1963).

Thus for 56 years the fur seal herds of the North Pacific have, first, been restored as nearly as practical to that level of abundance which will provide the maximum sustainable annual crop of furs, and, secondly, kept at that stage to the continuing satisfaction of the member governments. There is no other marine conservation convention with such a record of success for so long a period. (Scheffer and Todd, 1967).

It should be noted that there are no private entrepreneurs involved in the fur seal business. Robben Island went to Russia at the end of World War II and thus the two rookeries (Robben and Commander) in the western Pacific are under Russian control and operated as a State enterprise. After a brief and unsatisfactory period of leasing the Pribilof herds to private enterprise (Tomasevich, 1943), the Department of the Interior of the United States Government took over the management of that herd and has continued in that role to this day. The cessation of pelagic sealing brought an end to private Japanese and Canadian enterprise in this fishery, and the respective governments receive the allotments of skins or money owing to them annually under the treaty. This continues to be a satisfactory arrangement to them.

There has not as yet been any other international conservation agreement which has provided for a distribution of the wealth generated by the conservation measures undertaken as this one has done. Although there is no barrier under international law preventing another nation from engaging in pelagic sealing, none have done so, and it may be that this is in the process of forming, by the practice of nations, new international law. On the other hand the absence of new entrants into the fishery may result from the entire fur seal business being of modest economic interest and the cost of entering the business by nations outside the North Pacific being relatively high.

In 1957 an agreement to regulate sealing for harp seal, hood seal and walrus in the waters from Greenland to Novaya Zemlya was concluded between Norway and the Soviet Union. The objective is to obtain the optimum yield from the resources and coordinate scientific investigations on seals in the convention waters. No catch quotas have yet been established although there have been agreements on hunting seasons and some fleet restrictions, while the laborious research needed to provide a scientific basis for future decisions goes on. (Mathisen and Bevan, 1967).

A protocol to the International Convention for the Northwest Atlantic Fisheries to provide protection for the seals of that region is in the final stages of ratification.

International Pacific Halibut Commission

Another somewhat different form of approach to these problems was taken by Canada and the United States in 1923 when they negotiated a treaty to investigate the halibut fishery in which the nationals of the two engaged jointly in the Northeast Pacific. After viewing the results of the initial research, in 1930 the two governments renegotiated the treaty and gave the Commission established under it authority to regulate the fishery. By 1953 the results of the regulations by the Commission were judged to be so beneficial that the treaty was once again renegotiated, somewhat broadening and clarifying the powers of the Commission to regulate.

This convention developed these novel features: (1) the Commission provided for had a budget of its own, supported in equal parts by the two Governments, adequate to provide for the Commission to hire its own scientific staff

and do its own research, which it has continued to do; (2) it had authority designed to permit it to accomplish the objectives assigned to it by the convention; (3) the objective of the convention was clearly stated to be to guard the welfare of the fishery by protecting the halibut stocks of the Northeast Pacific to such level that they would produce the maximum sustainable yield; and (4) although the treaty was silent on the subject the Commission, at an early stage in its work, formed an advisory committee drawn from the industries of the two countries to assist it in its work. To guard the economics of the industry the halibut stocks were gradually brought to a level which would support the maximum sustainable yield, and they have been kept approximately at that level for the past fifteen years by limitation of total fishing effort.

There was no attempt made to divide the catch between the two nations. There was freedom for all hands, irrespective of nationality, to fish until the annual quota was taken. The effect over the years has been for the Canadian catch to increase and the American catch to stay reasonably level. This has not caused contention. As a matter of fact in 1950 a particular separate convention was negotiated by the two countries, with the approval of their respective industries, under which each extended port privileges to the halibut vessels of the other during the halibut season. (U. S. Senate, 1965).

A main complaint brought against the operation of this Commission (Burkenroad, 1951; Gordon, 1953; Crutchfield and Zellner, 1963; Christy and Scott, 1965; and others) is that the Commission's activity, by maximizing the physical yield of halibut and failing to limit entry into the fishery, destroyed the net economic yield that might have been derived from the fishery had the standard of maximizing the net economic yield been adopted.

This effect of its regulations was recognized by the Commission and its scientific staff at the beginning of regulation in the early 1930's, but the advisory committee and the Governments, when it was explained to them that shorter and shorter seasons would result from annual quota regulation and free entry to the fishery, voluntarily chose the path of maximizing the physical yield from the resource. The fishermen, vessel owners and processor-distributors have remained content with this over the years, somewhat to the despair of the economists. The vessels and fishermen have gone off into other fisheries and occupations at the end of the short halibut season, and have continued to prosper compared to some of the other fisheries of the region.

Following directly from the excellent preliminary results from the halibut convention, Canada and the United States in 1930 negotiated a convention to similarly protect the sockeye salmon fisheries dependent upon runs originating in the Fraser River. This convention came into effect in 1937. The International Pacific Salmon Fishery Commission formed under it was given the power to regulate the fishery after it had completed eight years of investigations. It had its own scientific staff paid for by contributions in equal amounts by the two governments. It also had an industry advisory committee, but in this case it was provided for in the protocol of exchange to the convention on the basis of the successful results there had been with an industry advisory committee for the International Pacific Halibut Commission.

This Commission had, however, one quite novel feature. The catch was to be divided equally each year between the fishermen of the two countries. On the face of it this would seem to be a practical impossibility, but the Commission, year after year, has improved its knowledge of the characteristics of

the several salmon runs and fisheries under its jurisdiction to such an extent that it has been able to do this to the practical satisfaction of the industry and the Governments.

The success of this Commission's work has been so great that in 1956 the treaty was renegotiated to give the Commission similar managerial authority over the pink salmon fisheries dependent upon Fraser River runs. (U.S. Senate, 1965).

Again, the chief complaint brought against this Commission has been that by failing to limit entry to the fishery and concentrating on maximizing the sustainable physical yield, the net economic yield, or rent, has been dissipated. Since the Commission only regulates the total catch to be taken it is perfectly within the purview of the respective country to limit entry into its own fishery on its half of the catch. The Canadian Government is, in fact, studying means to approach this politically delicate task in the gill net fishery of the Fraser River.

Following directly on the success of these two northeast conservation commissions, the United States and Costa Rica negotiated a convention in 1949 establishing the InterAmerican Tropical Tuna Commission to investigate the effect of the fishery on the tuna and bait stocks of common concern in the eastern tropical and sub-tropical Pacific and make regulatory recommendations to the Governments based on its findings. (U. S. Senate, 1965).

This Convention also provided for a Commission and a research staff with the joint expenses to be paid by the two governments not in equal parts, but on the basis of relative use of the resource. The objective of the Convention was clearly stated to be maximizing the total sustainable physical yield from the resources.

The Convention, unlike those in the Northeast Pacific, was open ended so that any other nation involved in these fisheries and interested in joining the work of the Commission, could adhere to the Convention upon request and consent of the others. In this manner Panama, Ecuador, Mexico and Canada have become members. This Commission did not have regulatory authority in itself, but did have the responsibility of making conservation recommendations to the member countries.

The scientific work done by the staff of this Commission has been extraordinarily competent and fruitful. Aside from its own research it has been able, through cooperation with other scientific institutions of its member countries and interested non-member countries such as Colombia, Peru, Chile and Japan, to much expand knowledge of the ocean regime of the eastern tropical and sub-tropical Pacific.

Early in its work (by 1955) the Commission was able to establish that none of the stocks within its purview was being over-fished, but the yellowfin tuna catch had been close to this point in 1950. Throughout the decade of the 1950's, economic conditions prevented the increase of tuna fishing effort in the eastern Pacific. Accordingly the IATTC did not recommend regulations to its members until 1960.

The members are in an awkward position because the fishery operates on two species of tuna—yellowfin and skipjack—to an extent that the economics of the industries is dependent on the yield from both species. It is difficult to catch one species to the exclusion of the other. Yet the scientific evidence indicates that the skipjack stock will stand a considerably greater yield than presently taken from it, whereas for yellowfin the effort the fishery employs

at the present corresponds with the maximum sustainable yield or slightly exceeds it. Accordingly the nations began limiting the effort on yellowfin fishing in 1966 and have refined and extended this in 1967. It cannot be said that the regulatory regime yet is very satisfactory, but it can be said that there is no over-fishing on skipjack and such over-fishing as exists on yellowfin is of modest extent.

This Commission is now running into trouble from at least two sources: (1) there has not yet been worked out a system satisfactory to the member nations for distributing the catch among nations when regulation becomes necessary; and (2) insufficient funds have been made available to the Commission for establishing some of the parameters it requires for making more precise estimates of fish stock size and the effect of the fishery upon it. One of the principal countries has not paid its contribution for the last few years and has served notice of withdrawal from the Convention. There is no provision in the Convention for limitation of entry into the fishery.

The International Whaling Commission

Between the initiation of substantial commercial whaling in the 11th century and its expansion into Antarctica in the 20th century there was adequate evidence that whale stocks were very susceptible to over-fishing. In 1924 and 1927 the League of Nations made strong but fruitless efforts to bring about international agreements to restrict whaling. In 1929 Norway, then the major whaling nation, passed some unilateral regulations. In 1936 a Convention on this subject was negotiated in Geneva. It was generally accepted by the whaling countries and was improved upon by conferences in London in 1937, 1938 and 1939.

The effect of these activities was inconsequential. The regulations adopted were stop-gap measures; they protected unimportant species, closed inconsequential areas, established minimum sizes, prohibited killing females with nursing calves, but never came to the core of the problem—the limitation of kill on a particular stock to the level corresponding with maximum sustainable yield.

In 1946 a conference of all whaling countries in Washington, D.C., resulted in the establishment of an International Whaling Commission having regulatory powers. This came into effect in 1948 (International Commission on Whaling, 1950).

For the first time in international whaling history an overall catch quota was set at 16,000 blue whale units, and therein lay the core of the trouble. The thrust of the convention was to protect the investment nations had in whaling, not to limit the catch from any stock of whales to that level corresponding with the maximum sustainable yield. Catch quotas were, and are, calculated in blue whale equivalents. While this made sense industrially it made no sense whatever from a conservation standpoint. The quotas were not calculated from mortality, recruitment and growth rates of particular species or stocks. These were not known and the expensive research to find them out was not funded.

The quota that was established, as incompatible as it was with natural history, was too high in toto but it remained in effect except for minor reductions until the 1960-61 season. In this short period of years the blue whale had ceased being an important contributor to the catch, the formerly ignored fin whale bore the brunt of the killing, and even the small sei whale became im-

portant in the catch. Efforts to allocate fixed percentages of the quota to each whaling nation and stop expansion of effort were to no avail. Nations, instead, built new whaling fleets and bought old ones that had gone broke.

Public outcry over the decimation of the world's whale stocks resulted in the establishment of a committee of neutral expert population dynamicists to examine all relevant data and make recommendations to the Commission. Two reports by these committees (Chapman, D. G., 1964, 1965) finally broke the deadlock on reducing catch quotas in the Antarctic whaling. The quota of 15,000 blue whale units adopted for the 1962-63 season has been reduced to 3,500 units for the 1966-67 season, which is still higher than the limit recommended by the scientists.

The International Whaling Commission still has not adopted the sensible system of setting quotas by species or stock, has not provided for international inspection of carrying out its regulations, but it has now restricted the total kill to the number of blue-whale units recommended by the scientists it commissioned. No considerable scientific work has been initiated likely to yield information needed for the formulation of better regulations.

During this past five years of restriction in the Antarctic the two largest remaining whaling countries (Soviet Union and Japan) have, respectively, built new whaling fleets and bought old ones from other nations, and sought to recoup their investments by intensifying whaling in the North Pacific.

The International Whaling Commission has become the epitome of ineffectiveness in international cooperation aimed at conservation or rational management of high seas fisheries. Its failures provided the arguments for those who would divide the ocean into national sectors, but it must be noted that Chile's 200 mile territorial sea claim was supported in great part from its desire to avoid the regulations established by the International Whaling Commission. Since IWC regulations applied only to the high seas and all of Chile's whaling occurred within 200 miles of Chile, an extension of the breadth of its territorial sea to 200 miles solved that problem. It must also be noted that Peru, after enforcing its 200 mile limit against other whaling countries, killed migratory sperm whales passing through its "territorial sea" with sufficient effort to over-fish them by its own activity. (Saetersdal, Mejia and Ramirez, 1963).

The Indo-Pacific Fisheries Council and FAO

At its third session, held in 1947, the FAO Conference recommended that FAO should take the initiative in forming regional councils for the scientific exploration of the sea in parts of the world not then served by similar bodies, giving primary attention to: the Northwestern Atlantic, Southwestern Pacific and Indian Ocean, Mediterranean Sea and contiguous waters, Northeastern Pacific, Southeastern Pacific, Western South Atlantic, and Eastern South Atlantic and Indian Ocean. (Carroz, 1965).

The first outgrowth of this extensive scheme was the formation of the Indo-Pacific Fisheries Commission in 1948. By 1965 there were seventeen members—France, the Philippines, the United States, Thailand, India, the Netherlands, Burma, Ceylon, the United Kingdom, Australia, Pakistan, Korea, Indonesia, Viet Nam, Cambodia, Japan and Malaysia. China had been a member, but ceased to be in 1952. Indonesia withdrew in 1965.

IPFC is organically a part of FAO, but semi-independent, having been organized under the provision of Article XIV of the FAO constitution. It follows

the general pattern of ICES in that it has no regulatory powers over fisheries in the area but coordinates and reports on fishery, oceanographic and related research carried on by member governments in the area. It conducts its affairs through continuing committees. It holds conferences on special subjects and plans joint programs of activity among its members.

Unlike ICES it deals with fresh water as well as marine problems and is much concerned with fishery technology and economics as well as other aspects of fishery development. Its secretariat is supplied by FAO, which also gives limited support for travel by Council officers attending committee meetings held between annual meetings and for publication of transactions.

To an outsider looking into the IPFC region, and into IPFC operations, the appearance is given that this is a pretty effective organization, considering the stage of development of the fisheries and aquatic sciences in many of the member countries, the political strife there has been in the region, the great size of the area and the complexities of the problems with which IPFC attempts to deal. For the first four years of its life the Council met once a year. Since 1952 it has met every other year. Attendance at meetings is good; the Council has without a doubt done much to stimulate the growth of fishery science, as well as fisheries, in the region.

Nevertheless there has been growing unrest in IPFC as to the effectiveness of its work in recent years. These problems do not arise as much from over-fishing or competitive problems among the member countries as in the northern hemisphere. The problems are more concerned with a feeling of ineffectiveness. Resolutions are passed and nothing happens. Neither the member countries nor FAO have been very liberal in supplying funds or other support to permit the recommended resolutions to become effective.

Adding to this dissatisfaction has been the left out feeling of the new countries of East Africa and the Arabian countries west of Pakistan. Although eligible for membership in IPFC none of them belong or seem to intend joining.

These problems were discussed in some detail at the second, third and fourth sessions of FAO's Advisory Committee on Marine Resources (FAO, 1964, 1965a, 1967a) and by the FAO Committee on Fisheries (COFI) at its first and second sessions (FAO, 1966b, 1967b). The upshot of the matter has been that FAO COFI has recommended the creation of a new fishery body to attend to Indian Ocean fishery problems while retaining IPFC in its present role. Accordingly the situation of international fishery organization in the Indo-Pacific area, related to FAO, is currently in somewhat of a state of flux. IPFC, however, is still alive and going.

A second Council growing out of the action of the 1947 FAO Conference on this subject was the General Fisheries Council for the Mediterranean (GFCM). This was organized at a meeting called by FAO in Rome in 1949, and held its inaugural meeting in 1952 (General Fisheries Council for the Mediterranean, 1952). It, also, is organized within the terms of Article XIV of the FAO Constitution and the pattern of its work, support, and relationships with FAO and the member countries is much the same as that of IPFC. The Council has headquarters in Rome; the secretariat and limited publication support is supplied by FAO, the secretary of the Council organizes the annual meetings and serves as editor of the proceedings. While not the most vigorous and dynamic fishery body in the world GFCM appears to be reasonably satisfactory to the member nations. It has little or nothing to do with the managerial problems of Mediterranean fisheries.

A third council, a Latin American Fisheries Council, was stimulated to growth at about this time, but it never received the necessary ratifications required to come into being, and with this failure the idea of organizing a system of regional fishery councils under Article XIV of the FAO Constitution as envisioned by the 1947 FAO Conference came to an end.

A difficulty with Regional Fisheries Councils organized under Article XIV of the FAO Constitution was that they were established under a convention which required ratification by the member countries. With the failure of the Latin American Fisheries Council convention to obtain adequate ratifications this mechanism was recognized by FAO to be too cumbersome, and the 10th session of the FAO Conference (FAO, 1959) authorized the abandonment of further activity respecting the Latin American Fisheries Council and authorized the stimulation of Regional Fisheries Commissions instead under Article VI of the FAO Constitution. The organization of such Commissions under Article VI did not require ratification by adhering members.

In 1961 efforts were undertaken to organize a Regional Fisheries Commission for West Africa. An organizational meeting was held at Dakar and a first session was held in Tunis. The political situation then existing in West Africa proved to be unsuited to successful action along this line at that time.

Better success attended the establishment of the Regional Fisheries Advisory Commission for the Southwest Atlantic, organized among Argentina, Brazil and Uruguay. This Commission has held three sessions (Rio de Janeiro, 1962; Mar del Plata, 1964; and Montevideo, 1966). It has led to cooperative programs of research among the three countries and an increased liaison between the fishery scientists working in the region. (FAO, 1965b).

A fault in this sort of Commission has come to light in this Southwest Atlantic Commission (CARPAS). Article VI of the FAO Constitution (FAO, 1960) provides that membership in regional commissions organized under it are open only to member nations and associate members of FAO, whose territories are situated wholly or in part in the region. This did not work adequately with CARPAS. Paraguay wanted to be a member, and it was desired that she be, but her territory was not situated on the Southwest Atlantic. Again, Spain, Russia, Cuba and some other countries were fishing in the area but did not have territory in the region and thus could not become members of CARPAS.

Since this proves to be a general impediment to the organization and practical operation of such regional fisheries commissions within FAO, COFI at its second session (FAO, 1967b) recommended a change in this provision of Article VI of the FAO Constitution so that regional fisheries commissions could be established in reference to sea areas, rather than land areas, with provision for any member nation working in that sea area being eligible for membership in that Commission.

International Commission For The Northwest Atlantic Fisheries

A sixth general sort of international fisheries body was initiated in 1949 with the negotiation of the Convention establishing the International Commission for the Northwest Atlantic Fisheries (ICNAF).

To a considerable extent the ICNAF Convention melded together practice in this field in Europe arising from ICES experience and that from the Pacific arising from experience with the Halibut and Salmon Commissions. As with New World practice the objective of ICNAF was to maximize the physical

yield from the resources within its purview, it was equipped with advisory committees (on which, in practice, industry was represented), and there were provisions through which recommendations could become regulations affecting the fishermen of all member nations.

On the other hand, although there was provision for ICNAF to hire its own staff, as did the Pacific commissions, it has in fact had only a small secretariat and has depended upon national scientists working through committees to do and correlate its research. ICNAF combines in many ways the concepts of both ICES and NEAFC in the Northeast Atlantic, in that it combines research and management functions in one organization. A new development in ICNAF was the division of its rather large and diversified region into five panel areas so that the special problems of the sub-region could be dealt with preliminarily by those member nations particularly involved with that sub-area.

From the standpoint of research accomplishments ICNAF appears to have worked very well. A greatly enhanced cooperative investigative program of the whole Northwest Atlantic Ocean and its resources has been carried out. Symposia on particular questions held either alone or jointly with ICES and FAO have been a particularly fruitful ICNAF activity.

The management of the resources within its purview does not seem to go much better than under the ICES-NEAFC system in the Northeast Atlantic. It is not obvious from the outside whether this is related to the system of operation or to the similarity of the problems and nations involved.

In ICES the research problems are dealt with by scientists in the ICES committee establishment and the management problems are dealt with by administrators in a wholly different organization, NEAFC. The relationship between the two is conducted through a Formal Liaison Committee of ICES which NEAFC provides for and partially funds (International Commission for the Exploration of the Sea, 1967). The apparatus, while cumbersome, has dealt reasonably well with managerial problems which could be handled by the regulation of mesh size of trawls. It has not yet been able to deal satisfactorily with managerial problems requiring the cessation of growth in total fishing effort on a fish stock or its cutting back.

In ICNAF the key delegates are administrators, and the advisors to delegations in practice include industry representatives as well as scientists. Accordingly the scientists have not been able to act together in quite the same atmosphere as in ICES, but the impact of their views on administrators has possibly been somewhat more direct and rapidly acting than in NEAFC. To an outside observer the practical results of the system appear to be about the same, so far, as in the ICES-NEAFC system.

Despite the complaints of the scientists in the ICNAF system about interference from administrators and industry representatives in their deliberations, the scientific results appear to be about as good as in the ICES-NEAFC system, when account is taken of the relative youth of the ICNAF organization. ICNAF also has been able to handle some managerial problems involving regulation of trawl mesh size in a reasonably satisfactory manner, although very slowly and imperfectly. As in the ICES-NEAFC system, however, the ICNAF system has not yet been able to handle satisfactorily the managerial problems requiring limitation of total fishing effort on a particular stock of fish. The rapid growth of total fishing effort in the ICNAF area is now de-

manding such limitation, as in the Northeast Atlantic, in order to prevent glaring over-fishing.

Since the countries involved in both systems are the most advanced fishing countries in the world, with the longest history in fishery science and fishery management, these problems are receiving continuing attention, and both systems are in the process of modification, or discussion aimed at improvement. Essentially the problem is that the scientists are able to agree pretty well on the level of effort in the major fisheries that corresponds with the maximum sustainable yield, but the administrators are unable to agree on the way in which fishing efforts should be limited in order to maximize either total physical yield or net economic yield.

In 1960 at a Symposium on African tunas held in Dakar, Senegal, under the auspices of the Commission for Science and Technology of the States South of the Sahara, (CCTA), a group of representatives from West African nations called for the establishment of an international tuna commission for the east central Atlantic modeled on what they felt to be the successful Inter-American Tropical Tuna Commission. This led to CCTA making a request to the Secretary-General of the United Nations in 1961 to initiate such activity, which action the Secretary-General referred to FAO (FAO, 1963a).

This posed an exceedingly complex problem to FAO. So far as scientific information was available it was understood that the stocks of tuna fished off West Africa were likely to be migratory across the whole Atlantic, so that research as well as regulation would have to apply across the Atlantic to be effective. The fishery was as broadly migratory as the fish and was participated in extensively by vessels from Asiatic countries as well as from countries in North America, South America, Europe and Africa. The bulk of the fishery lay south of the area of principal interest to ICES and of statutory interest to ICNAF. Neither the Regional Fisheries Commission for West Africa, nor CARPAS, was in a position to bring its efforts to bear on this wide ranging sort of fish or the fisheries upon it.

FAO appointed a Working Party for Rational Utilization of Tuna Resources in the Atlantic Ocean which met in two sessions to deal with this nexus of problems (FAO, 1963a, and FAO, 1965c). This resulted in a conference of plenipotentiaries being convened under FAO auspices in Rio de Janeiro in 1966 (FAO, 1966a) which negotiated a convention to establish the International Commission for Atlantic Tunas.

The apparatus which this convention will provide when it comes into force will be an outgrowth of the ICNAF model, but with inputs from other models as well. Its function will be to provide for the conservation of all tuna populations in the Atlantic Ocean. It will be able to organize its work in panels, which may have either geographic or a species base. It will be open-ended, so that any member of the United Nations family can become a member. It will have a formal relationship with FAO, but be autonomous from it. It will have the ability to have its own scientific staff (as in IATTC) but the financial clauses indicate that it is more likely to depend upon the research efforts of national scientists, as in ICES and ICNAF. This convention is still in the process of acquiring the necessary ratifications to come into force and the apparatus it provides, thus, is still untested.

Restrictive Fishery Conventions

In the 1950's three different international conventions came into force

designed to limit the fishing of particular nations in particular high seas areas. Each of them has a different basis for doing this. They are (1) the Convention establishing the South Pacific Commission among Chile, Ecuador and Peru (MacChesney, 1957); (2) the Convention establishing the International Commission for High Seas Fisheries of the North Pacific Ocean (U.S. Senate, 1965) among Japan, U.S.A. and Canada; and (3) the Soviet-Japanese Fisheries Convention (Mathisen and Bevan, 1967).

The first of these was organized in August 1952 when the Permanent Commission for the Exploitation and Conservation of the Maritime Resources of the South Pacific was established. This commission is an expression of the claims by Chile, Ecuador and Peru to sovereignty over the sea and its resources to a minimum distance of 200 marine miles from their respective coasts. The stated objectives of the Commission are to secure a better exploitation and conservation of the maritime resources of the South Pacific. Three sub-commissions were created to deal with treaties, diplomatic matters and technical subjects. The inaugural meeting took place in December, 1954, and there have been meetings from time to time since. Although the commission has very broad terms of reference it has dealt so far mainly with efforts to control whaling. The apparatus is apparently not fully satisfactory to the members (FAO, 1967b).

The second of these conventions was negotiated among Japan, the United States and Canada in 1952, came into force in 1953 (U. S. Senate, 1965), and held its inaugural meeting in 1954. It has continued to meet annually, or more frequently, since.

It also has very broad terms of reference but the key feature of it is the so-called "principle of abstention," under which contracting parties that have not historically fished on stocks of fish being fully utilized by one or more of the other contracting parties will abstain from entering the fishery on those fully utilized stocks. The practical thrust of this convention was to keep Japanese fishermen out of the high seas fishery for salmon originating from North American streams and from the halibut fishery of the Northeast Pacific.

One result of this convention was a very much enhanced research program in the entire North Pacific centering around salmon, in the course of which it was discovered that salmon from Asian streams move far over toward the American mainland during feeding migration whereas salmon from American streams move far west of the "abstention" line of the treaty in their migrations and are caught by Japanese high seas salmon fisheries there.

Much dissension has arisen from this treaty in respect to its abstention principle as between Japan on the one hand and Canada and the United States on the other. The Japanese have not admitted any validity to abstention as a principle. At the expiration of the original period of the treaty (1963) the Japanese gave notice of desire to renegotiate this treaty. This renegotiation is still in progress.

The third of these treaties is in some respects the most interesting of the lot.

The history of the Japanese salmon fisheries on the Russian Siberian coast can be traced back to the 1880's. From the end of the Russo-Japanese war in 1904-1905 to 1928 the Japanese were dominant in this fishery. From 1928 to the outbreak of World War II there were annual negotiations between the countries over this fishery. Japan, of course, lost all rights in these fisheries at the end of World War II, including those of Sakhalien and the Kuriles. Sur-

prisingly, the Japanese surged back into the Asiatic salmon fisheries after about 1952 by high seas netting from both land-based stations on Hokkaido and from mother ships. The consequence was a decline in the salmon runs to the Siberian rivers. (Kasahara, 1961).

At the United Nations sponsored Conference on the Conservation of Living Resources of the High Seas held in Rome in 1955, and the meeting of the International Law Commission which followed directly thereafter (in both of which the Soviet Union participated) it was obvious that a new tenet of international law was developing. This was to the effect that a coastal country had a right to protect resources off its coast from being over-fished by others, even through unilateral action in some situations. (United Nations, 1956).

In February, 1956, a Moscow radio broadcast abruptly stated that salmon fishing in the Northwest Pacific would be restricted between May 15 and September 15, 1956. Permits from the Soviet Ministry of Fisheries would be needed to catch salmon in these waters. The regulation was aimed at restricting the catch to 25 million fish, whereas the Japanese had already targeted a catch of 100 million fish from this area for themselves alone. Since Japan was still technically at war with the Soviet Union negotiations were called for.

On May 15, 1956, (just in time for the opening of the salmon season) a long-range convention was concluded between Japan and the USSR, which covered the northwest Pacific, the Bering Sea, the Sea of Okhotsk and the Sea of Japan. It established a fisheries commission initially for the regulation of the salmon fisheries, but in 1958 regulation of the king crab and salmon fisheries was added to the responsibilities of the joint commission.

The Commission thus set up was essentially a negotiating body, and the annual sessions have been marked by hard and prolonged bargaining, often ending in a deadlock at the Commission level and requiring decision at the ministerial level. (Mathisen and Bevan, 1967).

There is no doubt that the Soviet-Japanese Fisheries Convention was forced upon Japan, but by the time the "Convention on Fishing and the Conservation of the Living Resources of the High Seas" was negotiated at Geneva in 1958 the method used by Russia to do this was pretty well incorporated into the Law of the Sea. Interestingly enough, neither the Soviet Union nor Japan has ratified that convention.

It is also worthy of note that in 1966, when it became possible for Japan to withdraw from the Soviet-Japanese Fisheries Convention, it not only did not do so but the Foreign Minister of Japan publicly stated that the Convention was working well as far as Japan was concerned.

SUMMARY

Seven different sorts of international fishery bodies and commissions, involving about 24 such organizations, have been examined and evaluated subjectively as to the success of their efforts. Perhaps some general comments can be justified.

(1) THERE IS GENERAL AGREEMENT among nations that fishery resources should not be over-fished and that they should be conserved. There is no objection among the nations to a definition of conservation as the aggregate of the measures rendering possible the optimum sustainable yield from resources so as to secure the maximum supply of food and other marine

products. This is agreed to in principle somewhat more enthusiastically than it is in practice.

(2) CONSERVATION CANNOT be effectively arranged for a stock of fish unless certain scientific facts are known. These include the rate of recruitment to the fish stock, its rate of growth, the rate of natural mortality and the rate of fishing mortality on it. These facts need to be in hand and understood before either the point (or area) of maximum sustainable physical yield or of maximum net economic yield can be calculated. Until there is fairly close agreement among national negotiators on this scientific basis for their negotiation, the negotiations are unlikely to be fruitful.

(3) SEVERAL DIFFERENT SYSTEMS of arriving at agreed scientific views on these matters have developed among the nations. The ICES system works well in an area such as the Northeast Atlantic where there are numerous competent fishery scientists and each nation has one or more on its team. It is unlikely to work well in regions of the developing world where all national sections do not have well trained fishery scientists. The ICNAF system works, apparently, about the same as the ICES system under similar circumstances. How it will work in the developing world remains to be seen as the International Atlantic Tuna Commission comes into effect. It can be predicted that it will not work in that instance unless the Commission is provided with competent scientific staff which is neutral as to national economic interest, or until the members of the Commission that do not have competent scientific staff of their own are provided with such. One nation simply cannot be expected to accept the economic neutrality of scientists employed by another nation.

The system where the commission hires its own investigative staff has worked very well in the International Pacific Salmon Fisheries Commission and the International Halibut Fisheries Commission, where the cost is borne equally by the member countries. It is showing signs of breaking down in the Inter-American Tropical Tuna Commission, where it has worked very well to date, but where both the major user and a principal smaller user of the resource are becoming reluctant to put up as much investigative funds as are needed.

Where there are strong scientific organizations in all the national sections, as in the Soviet-Japanese Northwest Pacific Convention, not very much mechanism besides a negotiating table seems to be necessary to make a conservation apparatus work internationally.

In the absence of adequate scientific strength in the national agencies or sections, the ICES approach has little chance of working. It has not yet been very productive in the FAO system of regional fisheries bodies. It might well be that in the developing world where fishery scientists are rare, and used mostly for administrative purposes where they are available, the provision of a staff of scientists to the Commission itself, as in IATTC, would work satisfactorily, but the rub to date has been money. The developing countries do not have it. To date FAO has not been provided with adequate funds to staff such bodies and this is at least one reason why its Regional Fisheries Councils and Commissions have not been more effective. Also it is not always the case that foreign scientists are welcome indefinitely in developing countries.

In instances where there is not faith in the scientific apparatus attached to a particular fishery body, an outside body of experts can be retained to settle a particular dispute, as in the case of the International Whaling Commission.

This obviously must be an ad hoc arrangement and money must be provided from some source to pay the cost.

Accordingly there appear to be several satisfactory mechanisms tested for attaining agreement on the scientific bases of a particular fishery conservation problem, and it does not appear on the surface that one type of such mechanism is outstandingly superior to another. All need money to work, both to do the research and to support the scientists who are needed to evaluate the results.

(4) WHILE IT TAKES TIME and costs money to attain the scientific bases for conservation regulation this is not the critical part of the problem. The road block to conservation normally comes down to a question of *division* of the wealth created by the joint conservation efforts.

In the International Pacific Salmon Fishery Commission the catch is divided equally between the two members. In the Fur Seal Convention the yield from the rookeries is divided by proportions agreed to in the convention. In the Soviet-Japanese Northwest Pacific Convention the hard bargaining sessions each year, conducted with considerable acrimony and settled in amity, appear to be trending toward an amicable division of the catch among those two nations but great animosity toward new entrants, such as South Korea.

In the case of the Halibut Commission there has been no attempt to divide the catch between the two nations involved, and there has been no controversy, except a belligerent approach by both nations to new entrants. In the IATTC the same situation exists, but it is not clear that this will remain satisfactory to the member nations as fishing effort in the area grows and greater restriction of its use becomes necessary.

Efforts to exclude nations from fisheries on the high seas through novel theory, as with the South Pacific Commission and the International Commission for the North Pacific Fisheries, do not appear to be very effective in a continuing manner. The South Pacific apparatus has not excluded foreign fishermen from that area yet and the North Pacific system appears to be breaking down.

In ICNAF, ICES and IWC, real over-fishing problems exist which are well known, but have not yet been susceptible to treatment. There is little disagreement left concerning the scientific facts. Lack of action to provide for conservation derives almost solely from lack of agreement as to how to *distribute* the proceeds of the conservation among the nations.

(5) THERE IS NO AGREED general formula by which sovereign nations can distribute the proceeds of the conservation regimes in which they are involved. Each instance where this has been done so far has been the result of hard and long negotiations. Initiation of these negotiations has ordinarily been forced by sufficiently serious over-fishing to cause severe economic stress in the fishery, plus severe public reaction to the wastage.

World public opinion is becoming less and less tolerant of such wasteful nonsense, and is becoming increasingly easy to mobilize. It is this which is bringing sense slowly to the remaining whaling countries, not native acumen. (Suisan Tsushin, 1967).

Heretofore, schemes of dividing such proceeds, as with several situations in the North Pacific, have depended upon agreement between nations presently fishing such resources, and the absence of new entrants into the fishery. This appears to be a less and less satisfactory basis to use. The rapid rise of nations

in fishing strength, including distant water fishing, is exemplified by Taiwan, South Korea and Ghana, all of whom have come in a very few years from being strictly coastal fishers to becoming strong distant water fishers. Israel, Greece, Spain and Italy have been moving similarly, and other countries are stirring.

Schemes of dividing the proceeds of conservation programs among participants in the present fishery to the exclusion of new entrants appear to be less tenable in the future than in the past, because improved fishery technology is available to all countries and is being rapidly adopted by many, often through the assistance of FAO, Special Fund, World Bank, or other international aid schemes.

(6) THE PAST RECORD indicates that conservation schemes are put into effect more rapidly when the scientific bases of the problem are known and agreed upon, and there is no indication from past practice that conservation schemes will be adopted in the absence of such agreed upon knowledge. While the capability to obtain such information exists in most countries of the north temperate zone this is not generally the case in the tropics and sub-tropics, which is where major international fisheries are developing rapidly and where it is certain that others will develop soon. The experience of Peru indicates that modern technology can develop a fishery from almost a standing start to a situation of maximum sustainable yield, or beyond, in as short a time as six years—which is too short a time to train competent fisheries scientists locally.

There is a positive need to provide developing nations with expertise in fishery conservation science and practice. In the long run this must be accomplished by training native experts, but this is a long process and fishery problems will seldom await its completion. In the short run this can be circumvented temporarily by providing expatriate scientists either on the staff of local agencies, or seconded from elsewhere (such as by FAO), or on the staff of an international commission of which the nation is a member (as in IATTC).

The practical situation in the world is that developing nations have not got the money to hire expatriate fishery scientists to their needs and often they do not want to do so if they had the money; FAO has not got the money to furnish the expatriate fishery scientists where needed for free and it is forced to use what scientists it has to *develop* more fisheries; and nations operating distant water fisheries into the tropics and sub-tropics show no inclination at all to provide further examples, such as IATTC, where the distant water fishing country pays most of the cost of supporting an independent and neutral scientific staff for an international fishery commission to which the developing countries belong and have equal voice and vote in policy determinations.

(7) THE UNITED STATES has an enviable record in high seas fishery conservation to date. It supports international fishery commissions in all of the major fisheries in which its flag vessels participate with flag vessels of other nations. It has been energetic in pressing for rational international fishery practices in fisheries where it does not operate with its own flag vessels, both specifically as in the case of the International Whaling Commission, and generally as in the international actions that led to the 1958 "Convention on Fishing and the Conservation of the Living Resources of the High Seas".

The moving times and needs have now outstripped United States policy and action in this field, as has been the case in other fields of United States foreign policy. In the past ten years the thrust of development in the United States fish business has been away from the use of U. S. flag vessels to the establishment of fishing ventures in other countries using the nationals and vessels of other countries in procuring the raw materials for the United States market. This has been accompanied by solely owned and joint ventures in foreign countries that market their products abroad, and in the country where located, as well as in the United States. A measure of this tremendous development is the fact that in 1967 nearly 71% of the aquatic products used in the United States came from abroad.

These imported fish and fish products are considered by the United States Government as being of foreign origin, whereas most of them are the product of United States industry working abroad. There is little realization of the vast collecting networks for tuna, shrimp, lobsters, fishmeal, frozen fish blocks and other products that have been established in nearly all parts of the world ocean by United States industry. This has been a major factor particularly in the rapidly developing fisheries of the tropics and sub-tropics and the southern hemisphere generally, where the most urgent fishery conservation and jurisdiction problems are arising.

Although this rapid development of fisheries in the developing nations is strictly in accord with general United States foreign policy, it has been largely ignored by policy makers in the United States Government and has not been incorporated much into United States policy or actions in this field.

In the United States Government the prime fishery function lies in the Department of the Interior. Its fishery scientists and experts have been unable to follow the U. S. fish industry abroad with the flexibility it uses to attend to the domestic activity of the industry. The foreign aspects of fisheries are handled by a half dozen sections of the Department of State (S/FW, Office of the Science Advisor, individual desk officers, USAID, United Nations section, etc.) with little or no relation to the activity of United States industry either at home or abroad. The prime United Nations fishery function is in FAO, and policy respecting FAO activities is dominated in the United States Government by the Department of Agriculture, which has been reluctant historically to support fishery activities in FAO. Environmental ocean research in the United Nations family is mainly the responsibility of UNESCO, and this is related very slightly to fishery activity in the United States Government or in FAO. Environmental atmospheric research in the United Nations family is mainly the responsibility of the World Meteorological Organization, which is only slightly related to fishery research and development in FAO or ocean research in UNESCO. In the United States Government prime responsibility for policy in WMO rests in the Department of Commerce.

The upshot of all of this is that United States fishery policy and activity has not been able to follow United States industry policy and activity into the outside world. It is ineffective in West Africa, the Southwest Atlantic, the Western Indian Ocean, etc., where United States industry is active, where important supplies for the United States market originate, and where jurisdictional and conservation disputes over fisheries disturb the peace of nations.

(8) THE SOVIET UNION has also been vigorous in joining international fishery bodies and working toward the rational management of the resources its fishermen use. It is the most vigorously expanding fishing nation that uses

its own flag vessels for its fish production. It is presently involved in most of the areas of the world ocean where jurisdictional and conservation problems over fisheries exist and are arising. The planned doubling of its ocean fish production in the next few years will exacerbate existing problems and create many new ones.

Soviet fishery conservation policy has been materially hampered in its implementation by the fact that it does not belong to FAO and is thus excluded from the prime area of United Nations fishery activity, and the fact that it is politically unwelcome ashore in many areas of the world. This is posing enormous problems in international fishery practice.

(9) THE OTHER VERY LARGE fishing country that uses principally its own flag vessels in producing fish is Japan. Until very recently Japan has been reluctant to engage either in fishery conservation research or to admit that the fishing effort of its vessels contributes materially to over-fishing in any area of the world. It has bent its efforts largely to the development of fisheries, which is where most of its fishery money still goes. It is still reluctant to provide fishery research money to international fishery bodies and commissions, preferring to depend uniquely on the findings of its own scientists and little regarding the possibility that other nations, particularly in the developing world, may have difficulty in accepting the economic neutrality of Japanese scientists.

(10) THE NATIONS OF WESTERN EUROPE are now expanding their fishing effort out of the Northeast Atlantic throughout the Atlantic and into the western Indian Ocean. This expansion has been particularly vigorous down the coast of West Africa.

These nations have supported their national fishery agencies modestly in the past, and the international fishery bodies in which they are principally involved (ICES, ICNAF, IWC) even more so. This has been particularly true of the Mediterranean countries of Europe where some of the most vigorous development of distant water fishing in the world is now taking place.

These nations have also generally favored the use of ICES as their chosen scientific instrument in dealing with more distant area problems where their industries were moving, and have shown a reluctance to see the competence of FAO Fisheries Department, or other international fishery bodies, develop strength in this field.

(11) THE DEVELOPING COUNTRIES are adjacent to the sea areas where intensified fishing effort, both local and distant-water, is creating new fishery conservation problems most rapidly and most profusely. Generally speaking they have few native fishery scientists, weak domestic fishery agencies, and a much greater interest in developing new fish production than in conserving the resources that make the production possible. All are short of funds of all kinds, but particularly of foreign exchange with which to hire or support the activities of foreign scientists. They press for FAO and Special Fund to support the development of their fisheries, not the research required for conservation management. This puts a constant and heavy drain on slender FAO resources.

(12) THE ECONOMISTS WHO NOW rail at the efforts of successful international regimes aimed at maximizing the physical yield rather than the net economic yield from high seas fisheries resources appear to me to have missed the present urgent point.

There is no question but what there is validity to the contention that the wastage of fishing effort used beyond the point of maximum net economic yield should be avoided. It appears to me that this is a second order problem that is so difficult to solve from the political and diplomatic standpoint that it should not be tackled seriously until the conservation problem, that is, maximizing the physical yield, is a little better in hand.

It needs to be kept in mind that over-fishing from the standpoint of physical yield is always economically wasteful and in cases like whaling can be disastrous to the industry. Approximately the same sort of research and knowledge of resources, ocean and fishing effort is needed to solve either the problem of maximizing physical yield or economic yield. As difficult as it is to fund this research for attaining the objective of physical conservation it is at the present time practically impossible to seek such funds on the basis of maximizing the net economic yield.

CONCLUSIONS

From these considerations the following conclusions seem valid to me:

(1) Fishing effort on the world ocean is growing more rapidly than the means for governing it.

(2) For the most part the international fisheries bodies and commissions that now exist have contributed, each in its own fashion, to mitigating disputes among the nations over fisheries and have contributed much to the growth of understanding of ocean, resource and fishing effort that is required to resolve such diplomatic and political problems.

(3) There is no form of international body so far developed that appears to be unique in its efficiency in dealing with such problems. To the contrary it would appear that such bodies must be pretty well shaped to the existing political, economic and diplomatic conditions in a particular sea area to be able to deal effectively with such problems in such areas.

- (4) To understand how to deal with each such problem it is necessary to:
- (a) delimit the geographic range of the stock or stocks of fish in question,
 - (b) measure the total catch by some convenient unit of time,
 - (c) measure the effort required to take the catch, and
 - (d) measure the rate of recruitment to the stock, the rate of growth of the stock, and the rate of mortality of the stock.

This research costs money. It must be done by competent scientists whose national bias can be eliminated as a factor in order to be credible as a base of resource management.

(5) By these means agreement, within reasonable limits, can be had on the amount of fishing effort to be permitted in a particular fishery that will correspond to the maximum sustainable physical yield from the resources involved.

(6) On the basis of such agreed determinations it is possible, but difficult, for nations to arrange among themselves a division of the maximum sustainable yield. There is no general formula for this and so far such divisions have been achieved only by negotiations that took cognizance of all diplomatic relations among the affected nations.

(7) The developing nations, generally speaking, have neither the resources,

capability or urge to do the research required for determination of the scientific base. This must be done for them through channels whose credibility is accepted by them. Included in this category may be FAO bodies or non-FAO bodies in which the developing nation has full voice or vote. It is never likely to be obtained in bodies where the developing nation does not have equal voice, whether that be a national or an international agency.

(8) The distant water fishing nations, and those nations like the United States who depend upon foreign sources for their fish supply, must accept financial and other responsibility for husbanding the food resources of the world ocean if those resources are to be productive in perpetuity, and if costly disputes among nations over these issues are to be kept in hand.

(9) This will probably not be effective in the long run without a major overhaul of the United Nation's machinery for dealing with ocean-oriented problems, of which fishery disputes are the most numerous and vexing, but not the only ones. At the very least the ocean activities of WMO, FAO and UNESCO must be brought into better relations with each other, and the funding support for the whole United Nations ocean activity, in particular that related to food from the sea, must be strengthened in a major way.

(10) The United States Government is unable at the present time to bring its weight to bear on these problems in a manner well suited to furthering United States objectives in the increased use of the sea because responsibility for these activities is so diffused among agencies of the United States. It is not at all able, under its present organization, to incorporate the vigorous foreign section of the United States fish industry into a furtherance of its objectives in this field.

(11) The objective of maximizing the net economic yield from high seas fisheries is a second order problem of great complexity for which no solution is at present evident either in the international or the domestic field. It should be set aside until more success is had with solving the first order problem, that of maximizing the physical yield of food from the sea.

(12) The major nations, at this stage of history, will not risk war over fishery disputes nor will they justify major diplomatic confrontations on these grounds. They will not protect their distant-water vessels in their activities by force under any except the most grave conditions. Accordingly peaceful means must be found for the settlement of these disputes if the industries are to develop as desired. The only such means yet proven to be very practical is that of scientists working together to solve the natural history parts of the problems under some sort of formal or informal international auspices, and the diplomats and administrators using their agreed scientific results as a secure foundation for their own negotiations of the political, economic and social parts of the problems.

It is the scientific part of the apparatus that is not presently being funded adequately to keep abreast of the accruing problems. Unless this funding and this part of the apparatus is strengthened, a good deal of chaos on the sea is to be anticipated and rather quickly.

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