WASHINGTON SEA GRANT PROGRAM

LOCAL IMPACTS OF THE LAW OF THE SEA

Proceedings of a Conference
Held in Seattle
October 10–12, 1972

WSG–AS 73–8
August 1973

DIVISION OF MARINE RESOURCES
UNIVERSITY OF WASHINGTON 98195

Prepared under the
National Sea Grant Program

A WASHINGTON SEA GRANT PUBLICATION

LOCAL IMPACTS OF THE LAW OF THE SEA

Proceedings of a Conference
Held in Seattle
October 10-12, 1972

WSG-AS 73-8
Published August 1973
by Division of Marine Resources
UNIVERSITY OF WASHINGTON Seattle 98195

Printed in the United States

Distributed by University of Washington Press, Seattle 98195

Price $5.00

(Washington residents, please add sales tax)

ACKNOWLEDGMENT

This publication was supported by the Washington Sea Grant Program, which is a part of the National Sea Grant Program. The Sea Grant Program is supported by the National Oceanic and Atmospheric Administration, U. S. Department of Commerce.

C O N T E N T S

LOCAL IMPACTS
OF THE LAW OF THE SEA

P R E F A C E

These Proceedings emerge from a conference I proposed in the autumn of 1971. Three main areas of concern, not far apart, gave rise to that suggestion; these remain at high levels of interest now and probably will continue so for some time.

DEFINITIONS OF NATIONAL INTEREST

In 1970 the General Assembly of the United Nations resolved to convene a global conference on law of the sea, tentatively in 1973. An awareness of national interest on the part of many countries, mounting ever since the call for study and action by Ambassador Arvid Pardo of Malta at the United Nations in 1967, then picked up pace rapidly. Within the United States delineation of the complex mix and conflict of interests which are involved, and the struggle to integrate these into national policy, have become a fascinating and difficult social and political task. No doubt a similar process is occurring in other nations but differing according to varying political and social institutions and conditions.

Between nations, discussions as to what items should be on the agenda of the major meetings and preliminary exchanges on substantive positions have been slow and laden with conflict, yet modest and important progress at the 1972 Geneva preparatory meetings was sufficient to permit the General Assembly to decide, in December, to move ahead with plans for a 1973 organizational meeting of the Conference, to be followed by substantive negotiations in 1974.

Since 1967, technologically advanced, affluent nations and the lesser developed countries have responded in their differing ways to stirring visions of mineral riches on the seabed, of oil to be brought out, and of urgently needed food to be harvested from the oceans. Companion issues--balance of payments; control of passage of vessels, particularly military, through straits; pollution control; and freedom of scientific research--expand the spectrum of competing and conflicting interests within and between nations. Seventy percent of the earth's surface is composed of the seabed and the waters above. Small wonder then that their management and fate have become of highest concern for peoples of the earth.

Within the United States, as elsewhere, competing interests need to be heard, their claims weighed, and concepts and values defined to permit a reasonable and durable integration of these interests into national policy. Distant water fishermen, offshore fisheries, and anadromous fishing interests, such as the salmon industry, cannot all be maximally satisfied. Moreover, the Department of State is attentive to another sector of interests which at times seems to oppose the bread-and-butter concerns of fishermen. The oil and hard mineral industries have dreams in their corporate minds that are at odds with some strongly urged approaches to foreign policy. And often scientists and ecologists have still differing sets of priorities. This is the exciting and difficult nature of political and social life, calling for elaborate differentiation and specialization of positions but also for flexible and strong integration into practical policy.

U.S. ADOPTION OF NEGOTIATED AGREEMENTS

The second major set of considerations giving rise to this conference on Local Impacts of the Law of the Sea centers about recognition that, aside from the merits of the proposed international arrangements which U.S. delegates to the U.N. conference may bring back to the Senate and the President, recommendations must be adopted in Washington if the long years of study, competition of vested interests, political finagling and negotiations are not to be an exercise in futility. Too many deserving policy positions have failed to be realized because they lacked political support in the United States. The U.N. Genocide Convention, arrived at with major U.S. contributions and leadership and ratified by most major and many minor nations of the world, has still not been ratified by the United States. Repeal of the Connally Reservation to U.S. participation in the International Court of Justice--a move recommended by most presidents of the United States since the Reservation was adopted in 1946, including Richard Nixon, and by 305 of 310 U.S. deans and professors of law in a major study some years ago[1]--which is but another instance of failure to adopt meritorious policies that lack political support.

---

[1] *Report on the Connally Amendment* 1961; Committee for Effective Use of the International Court by Repealing the Self-Judging Reservation, 36 West 44th Street, New York, N.Y. Philip R. Bilancia, Executive Secretary.

Situations such as these are apt examples of how public participation can contribute to the nation's foreign policy--a subject of keen interest these days, especially in the wake of Vietnam and in light of withering Congressional and even cabinet effectiveness in developing and conducting foreign policy. Large public efforts at education and action in foreign policy matters have had rather discouraging results. A variety of studies reported in Kelman's[2] and Rosenau's[3] volumes are informative in this regard. Much of this information is caught up in Etzioni's view[4] that while citizen efforts appear to have little direct or immediate influence in final decision making, they do have a quite significant function in defining the matrix of alternatives among which the president and those influential with him may choose policy options and have assurance of significant political support within the nation.

CONTRIBUTION TO WORLD POLITICAL ARRANGEMENTS

A third set of interests which contributed to this conference stemmed from attention to the many problems of world society, vaguely perceived and structured as that may be, which increasingly call for global arrangements to deal with global needs and processes. Among the familiar list of matters of this kind may be found the following:

- Conceptions of and structures for national security
- Control of military and nonmilitary uses of nuclear devices
- Production and allocation of food sufficient to meet basic human needs in all countries
- Population management
- Development of political arrangements which are responsive to the power and the needs of both developing and economically advanced nations
- Preservation of the earth from pollution and from exhaustion of resources
- Development of ecologically safe sources of power.

Processes fruitful in developing national and multilateral policies and agreements regarding the oceans may have significant bearing on other global issues of the kinds enumerated, both through demonstration of effective new political arrangements and as a result of the impact substantive agreements reached may have on the quality of life within nations.

---

[2]Kelman, Herbert C. *International Behavior*. Holt, Rinehart and Winston, Inc., 1965.

[3]Rosenau, James N. *Domestic Sources of Foreign Policy*. Free Press, New York, 1967.

[4]Etzioni, Amitai. Social-Psychological Aspects of International Relations in *Handbook of Social Psychology*, eds. G. Lindzey and E. Aronson, 2nd Ed., 1968.

The present conference then had two immediate and related objectives:

1) to further the development of an informed, politically articulate segment of the population in the Pacific Northwest regarding Law of the Sea issues, a naturally high-salience topic in this salt-water territory

2) to use Law of the Sea problems as a concrete, somewhat circumscribed point of entry into the even larger arena of international relations and foreign policy.

We decided to bring together representatives of many segments of the community, particularly in the Puget Sound region but also Oregon, British Columbia, and Alaska, and experts of national standing in the primary substantive areas of the subject. Invited participants included leaders in industry, politics, relevant state agencies, interested citizen groups, labor organizations, university professors, high school curriculum directors, college and high school students, and foreign consulates, representatives of newspaper, television, and radio, among others.

Response to the conference was enthusiastic, concerning the conception of the conference itself and the content of the papers and discussion which ensued. We concluded that publication of these Proceedings would constitute a sufficient contribution to general awareness of the issued involved to justify the expense. For the Planning Committee I want to thank the speakers for their generous, warm-spirited participation. Thanks also to each of the sponsoring organizations for the freely given labors of their staff and volunteer workers and for their necessary financial help: These were the Council of Organizations for International Affairs, established by the United Nations Association of the U.S. in Seattle; the Battelle Memorial Institute, Seattle; Sea Grant Program at the University of Washington. The Battelle Institute provided facilities and conference staff expertise of delightful quality; Sea Grant, under the direction of Professor Stanley R. Murphy, gave the financial base and access to local and national experts and staff support which made the conference possible. The Council of Organizations, with the staff assistance of Carol Miller and her corps of volunteers, provided important access to interested community groups.

Samuel Goldenberg, Chairman
Planning Committee and Conference

A NEW REGIME FOR OCEAN SPACE

Opening Address

Arvid Pardo
Fellow, Woodrow Wilson
International Center for Scholars;
Former Ambassador to the
United Nations from Malta

Thank you very much, Dr. Wenk, for your most kind and more than generous words of introduction. I feel truly honored to be here tonight to take part in this very timely conference organized by the University of Washington. I would like to express my deep appreciation to the Conference Planning Committee and particularly to Dr. Goldenberg for having extended the invitation that makes it possible for me to address you on the vast and immensely complex subject of a new regime for ocean space.

I hope that I shall be forgiven if I do no more than scratch the surface of the subject with which I am supposed to deal in the next 50 minutes.

Water is essential both to the creation and to the maintenance of life: without the oceans we literally could not exist. The oceans cover two-thirds of our globe, and we take them as an unchangeable part of life. They have existed from the creation of the earth, and they will remain long after we are gone.

Man has used the seas and oceans for thousands of years, essentially for fishing but also as a highway for ships in peace and war. Once fish stocks were considered inexhaustible, and naviation concerned only the surface of the seas. This was the situation three and a half centuries ago when Grotius formulated the principle of freedom of the seas--a principle which was gradually adopted by all maritime nations and which still forms the basis of present law of the sea.

The principle of freedom of the seas was logically based on a number of assumptions including the following:

that there could be no danger of serious impairment of the seas as a result of the activities of man;

that naviagation beyond a narrow coastal belt totally subject to national jurisdiction requires no regulation;

that the living resources of the sea are so great that the possibility of their depletion is small;

that ocean space is so vast and its potential uses so limited that there is virtually no danger of any serious conflict of use.

For nearly three centuries the expressed or implied assumptions on which the freedom of the seas existed remained valid. The free and unimpeded use of the seas promoted trade, facilitated navigation, and fostered initiative in oceanographic research and in the search for and exploitation of living marine resources.

From the second half of the nineteenth century, the number, nature, and intensity of our uses of the seas began to change--slowly at first, and then with increasing speed, particularly since the end of the second world war.

The nature of navigation and fishing, the two main traditional uses of the sea, have changed radically since the turn of the century. According to a recent report by the United Nations on the uses of the sea (document E/5210), the world merchant fleet has trebled in the past 70 years, and its tonnage has increased 12 times, growing in recent years at an annual average rate of 8 percent. World merchant tonnage is expected to double by the end of this decade. A prominent trend is the rapid increase in tanker tonnage. In 1973, it is expected that more than 400 tankers, each exceeding 200,000 deadweight tons, will be in operation, as compared to 25 years ago when the largest tankers afloat scarcely exceeded 25,000 deadweight tons. The trend toward larger tankers is continuing, and it is expected that tankers exceeding 400,000 tons will be in use in a few years' time. Petroleum transported by sea could reach 5 million tons by 1980. Cargo ships are also increasing in size. For instance, combination ore/bulk-oil carriers of more than 150,000 dwt are presently in existence. It is also important to note that conventional ships are being supplemented by growing numbers of fast unconventional vessels, such as hovercraft and hydrofoils, and by submersibles of different types.

The greater number of vessels, their greater average speed, and the accuracy of modern position-fixing devices combine to produce areas of high density traffic. Furthermore, the increased draft of many vessels makes access to even some large ports difficult and dangerous.

Fishing, the other major traditional use of the sea, has also changed in nature and intensity. Improvements in boats, gear, fish detection, and fish processing and the development of new fisheries have permitted the doubling of the fish catch in 12 years from less than 34 million tons in 1958 to more than 69 million tons (including inland waters) in 1970. At the present annual average growth rate of 6 percent, the world fish catch probably will exceed 120 million tons within little more than a decade, thus approaching estimates of world limit of fish production given by some experts. Already there is evidence that some desirable stocks of fish, such as herring, cod, or salmon, are overexploited and that in some areas, such as in the Northeast Atlantic, fisheries appear to have reached their maximum sustainable yield.

No doubt, potentially rich fishing areas remain to be discovered, but inevithey are usually remote and their number is likely to be limited. Furthermore, an increasing number of countries are entering commercial fishing. Thus, at least in traditional fishing grounds, increasing numbers of costlier, more efficient vessels scramble to catch what appears to be a static or even diminishing population of desirable fish. This frequently causes hardship to fishermen and large-scale economic waste.

A significant factor in the continued expansion of world fisheries will be the avoidance of serious marine pollution, particularly in fish-spawning areas, several of which are not distant from the coast. This brings me to a use of the seas which is acquiring great importance. We all know that the seas are the ultimate receptacle of most of the wastes caused by man's activities, but I am quite skeptical of statements to the effect that in 25 years or in 50 years the seas will be dead. Not all wastes present a clear threat to man or to the living resources of the sea, and many are rapidly degraded into harmless substances.

Nevertheless, it is undeniable that increasing industrialization and urbanization on land, accompanied by multiplying activities in the oceans, are increasing enormously both the quantity and variety of pollutants reaching the seas. It is a matter for concern that in recent years there have been a number of reports of dangerous contamination of shellfish and of fish and that in restricted, but growing, marine areas near the coasts of industrialized countries, pollution has become serious enough to limit marine life and to make the consumption of a few surviving species of local fish dangerous to human health, while in many tourist areas water pollution is endangering a growing tourist industry.

The rapid advance of technology has multiplied man's uses of the seas. Little more than a century ago, the seabed was totally unknown. Apart from the laying of submarine cables, it had few known uses until perhaps 40 years ago. Petroleum production from the seabed was confined to very shallow waters close to the coast 20 years ago. As late as 1956, U.S. offshore petroleum production was 1 percent of U.S. domestic production; in 1970 it was 17 percent. According to the U.N. document which I have already quoted--"within ten years, offshore production of oil is expected to reach 25 million barrels a day or about 33 percent of the total world output of 70 million barrels a day." Until 5 years ago it was believed that petroleum could be found only on the geological continental shelf; now it is known that oil exists at great depths and rapidly developing technology is making many of the new discoveries accessible.

The manganese nodules of the deep ocean floor were a scientific curiosity until less than a decade ago. Three or four years ago it was still believed that their commercial exploitation lay in the distant future, but now it is almost certain that commercial exploitation will begin by 1975.

There are, of course, many other mineral resources in ocean space: some have long been exploited on a limited scale, others such as the mineral-rich muds of the Red Sea deeps still remain inaccessible to commercial exploitation.

Apart from petroleum and gas, the ocean mining industry is still in its infancy. It is difficult to foretell how fast it will develop; much will depend on the rapidity of technological advance, on the availability of large sums of risk capital, and on trends in the market prices of minerals. Of one thing, however, we can be sure: marine mining activities will grow and expand from the neighborhood of coasts into the deep oceans.

Changes in navigation and the development of offshore oil exploitation have hastened the advent of a host of new uses of the seas. Oil pipelines link many offshore oil and gas fields with distribution facilities ashore. Underwater storage tanks and tanker mooring points become necessary as oil production moves farther from the coast and as tankers tend to outgrow most ports. Increasing congestion and pollution in industrialized coastal areas make it necessary to consider the construction of pipelines for the removal of industrial wastes far out to sea or the creation of artificial islands and airfields. There are even plans for building floating artificial cities.

The multiplication of man's activities in ocean space has required a very great expansion of meteorological and oceanographic research and services, which in turn have led both to a great expansion in the number of oceanographic research vessels and to the creation of a global monitoring network which includes satellites, aircraft, vessels and buoys.

Finally, it is important to note that we have acquired the capability to change the natural state of the marine environment over vast areas far from the site of our intervention, for instance, by linking separate bodies of water by man-made straits or by diverting the course of major rivers.

It is quite clear that our uses of the ocean are quite different in nature and intensity from what they were at the time of Grotius or even from what they were 25 years ago. Ever wider areas are becoming studded with installations of one kind or another, and the oceans in all their dimensions are increasingly penetrated, used, and exploited for a variety of purposes. Gradually but visibly the oceans are becoming part of man's living space.

In short, we are experiencing a revolution in our use of the marine environment which is invalidating the basic assumptions on which the principle of freedom of the seas rests. It has for some time been clear that the living resources of the sea are not inexhaustible and that consequently measures of conservation should be taken with regard to the living resources of the high seas. More recently it has been agreed generally that the increasing size of vessels and density of traffic in congested areas make some regulation of navigation necessary. Environmental concerns and visible contamination of the seas, which is threatening the tourist industry of some countries, have led to international steps for the control of marine pollution.

More recently, it has been conceded that some areas, such as the seabed beyond national jurisdiction, and new uses of the sea, such as artificial islands, floating and fixed installations, and seabed habitats, may require more detailed regulation than the principle of freedom exercised with reasonable regard to the interests of other states.

Up to the present, however, international action has not been very effective and has been confined essentially to the fields of pollution and fishery conservation. Two articles in the 1958 Geneva Convention on the High Seas obligate states to draw up regulations to prevent pollution of the seas by the discharge of oil from ships or pipelines or resulting from seabed exploitation and to prevent pollution from the dumping of radioactive wastes. On the basis of these articles, international agreements have been negotiated in the framework of International Maritime Consultative Organization (IMCO) for the prevention of pollution of the sea by oil discharged from ships, and a more comprehensive regional agreement has recently been concluded in Oslo. Nevertheless, pollution of many areas of the sea remains a serious problem.

The conservation of fish stocks was a major subject of the 1958 Geneva Convention on Fishing. Article 1 of this convention reaffirmed that all states have the right for their nationals to engage in fishing on the high seas subject to their treaty obligations and to the interests and rights of coastal states. The convention also recognized that a coastal state has a special interest in the maintenance of the productivity of the living resources of the high seas adjacent to its territorial sea and that for this purpose it has the right to establish fishing conservation zones. A score or more of intergovernmental fishery bodies have been created, particularly since the end of World War II, either to undertake research or to promote measures of conservation and, occasionally, to undertake some regulation of the exploitation of fishing stocks. For a number of reasons the record of most of the bodies has, however, not been entirely satisfactory.

As for navigation, a number of voluntary traffic separation schemes have been recently instituted by IMCO to diminish the possibility of accidents in congested sea lanes near straits.

But these limited measures certainly have not been sufficient to deal satisfactorily with the numerous existing problems in the field of fisheries and pollution nor have they alleviated sufficiently the adverse effects of lack of recognized authority in those areas of the marine environment beyond national jurisdiction. Thus, coastal states have been under increasing pressure to take unilateral action by extending their own jurisdiction when their interests were endangered by abuses in the use of the high seas or in the exploitation of their resources.

The immediate causes of the extension of coastal state jurisdiction may vary. Sometimes it may be the need to exercise jurisdiction over the mineral resources adjacent to the coast "in the interests of their conservation and product utilization" as in the case of the United States in 1945, or the need to conserve the living resources of heavily fished adjacent areas of the high

seas and to reserve their harvesting to nationals as in the case of Iceland and of several Latin American and African countries, or to avoid marine pollution as in the case of Canada, or the need to regulate navigation as in some parts of the Gulf of Mexico or, finally, because of security considerations.

The pressures are complex and interacting. Whatever their cause it is important to remember that they are but a reflection of our more intense and diversified uses of ocean space which have been made possible by the advance of science and technology.

The encroachment of coastal state jurisdiction for one purpose or another is facilitated by the fact that, in the absence of general international agreement on jurisdictional limits, it is widely recognized that it is lawful for coastal states to extend their jurisdictions for justifiable reasons to reasonable--but undefined--distances from their coasts and by the fact that the 1958 Geneva Conference on the Law of the Sea did not succeed in reaching agreement either on the limits to territorial waters or on the limits of special coastal state jurisdiction beyond territorial waters which had developed more or less haphazardly in the preceding 20 years in response to the needs of states.

As a result there has been over the past decade an accelerating trend toward the extension of coastal state jurisdictional claims in the oceans: the majority of states now claim not a three-mile but a twelve-mile territorial sea: the fishery conservation zones. Archipelago states have put forward special claims. The majority of Latin American states have joined Ecuador, Peru, and Chile in claiming comprehensive rights to 200 miles from their coast. Such claims are supported by China and viewed with sympathy by an increasing number of countries in Asia and Africa. All these are extensive, but still limited claims.

Of more serious concern is the fact that the legal continental shelf was defined in such an ambiguous manner at the 1958 Geneva Conference as to permit virtually unlimited claims on the part of coastal states in a situation where technology is making the resources of virtually the entire ocean floor accessible and exploitable. While it is true that the U.N. General Assembly affirmed two years ago that "there exists an area of the seabed beyond national jurisdiction" and that the 1958 Continental Shelf Convention granted to the coastal states sovereign rights over its legal continental shelf only for the purpose of resource exploration and exploitation, it is also true that that nobody has attempted to indicate with any precision where we can find areas of the seabed beyond national jurisdiction and that the only feasible access to seabed resources far from the coast is through the superjacent waters. Thus, exploration of these resources, and even more their exploitation, inevitably involves the assertion of a measure of coastal state authority over the high seas, including the regulation of navigation and often also of other activities, such as scientific research and fishing.

In conclusion, there can be no doubt that present law of the sea is being very seriously eroded and that, if present trends remain unchecked, increasing uncertainty in applicable international law will gradually develop into chaos in the oceans. This probably would not only nullify the brilliant perspectives of rational development of two-thirds of our planet offered by scientific and technological advance but would also exacerbate conflict and seriously endanger both the military and general community interests of maritime countries. Distant water fishing powers are already constrained to bargain with coastal states for access to fishing grounds at considerable distances from the coast; scientific research is meeting difficulties at increasing distances from the coast; and coastal state sovereignty has been claimed over straits, such as that of Malacca, previously freely open to international navigation.

The approach of a state of anarchy in the oceans was considered to have such serious implications that the U.N. General Assembly, with only seven negative votes, agreed two years ago to convening a new general conference on the law of the sea, if possible in 1973, to deal not only with the seabed beyond national jurisdiction but also--and I quote from resolution 2750(c)--"with a broad range of related issues, including those concerning the regimes of the high seas, the continental shelf, the territorial sea (including the question of its breadth and the question of international straits) and contiguous zone, fishing and conservation of the living resources of the high seas (including the question of preferential rights of coastal States), the preservation of the marine environment (including *inter alia*, the prevention of pollution) and scientific research." The U.N. Committee on the Peaceful Uses of the Seabed was entrusted with the task of drafting articles for the conference.

In the debates in the U.N. Seabed Committee, two main approaches to a revision of the law of the sea have been advocated by coastal states.

The first approach, which can be characterized as a conservative approach, wishes to minimize insofar as practicable changes in the law of the sea as codified in the 1958 Geneva Conventions and emphasizes instead the need to reach international agreement on the limits of the existing zones of coastal state maritime jurisdiction. While the views of states supporting a cautious approach to the development of international law of the sea vary in detail, a composite, and possibly extreme, picture of such views might give the following results with regard to law-of-the-sea issues which have been the subject of major debate in the U.N. Seabed Committee:

1. There should be no change in the number and structure of existing zones of coastal state maritime jurisdiction, but the limits of each zone should be precisely defined. A 12-mile territorial sea is acceptable, provided transit through straits at present freely open to international navigation is not affected.

2. There is opposition to exclusive fishing zones beyond 12 miles from the coast; however, the recognition to coastal states of certain preferential rights to fish in areas adjacent to their territorial limits is reluctantly accepted. Beyond these areas, conservation of living resources of the sea would continue to be the responsibility of existing intergovernmental fishing bodies, which might be endowed with somewhat expanded functions and powers for this purpose.

3. A wide, but precisely defined, legal continental shelf is preferred; but the sovereign rights of the coastal state over continental shelf resources must not affect the legal status of the superjacent waters.

4. The regime of the high seas should remain unchanged, subject to such international agreements as may be negotiated, preferably within the framework of the U.N. specialized agencies, with regard to matters such as marine pollution, ocean data acquisition systems, and so on. However, there does not appear to be strong objection to the elaboration of a few norms of a general character with respect to major new uses of the sea, norms which could be incorporated in a revised convention on the high seas. There should be freedom of scientific research beyond territorial waters.

5. Finally, there is no objection to the creation of an international regime for the seabed beyond a precisely defined continental shelf; and it is accepted, somewhat unenthusiastically, that it may also be useful to establish a new international agency to implement some of the provisions of the regime. The powers of the agency must, however, be carefully defined and its functions limited insofar as possible to granting mineral exploration and exploitation licenses, preferably only to states, and to ensure the equitable distribution of the resulting net revenue, if any.

The second major approach to a revision of the law of the sea may be frankly characterized as a radical nationalist approach which aims at changing very substantially major provisions of the 1958 Geneva conventions. A composite and extreme picture of these views could be as follows:

1. Abolition of contiguous zones and fishery zones and extension of territorial waters to 200 miles from the coast; guarantee of innocent passage as defined in article 14 of the 1958 Territorial Sea Convention through territorial waters, but no special provision beyond innocent passage with regard to straits used for international navigation. Scientific research would be subject to coastal state regulation within its wide territorial sea. Marine pollution control would be the responsibility of the coastal state, which would also have a recognized right to take preventive pollution control measures for justifiable reasons beyond its broad territorial sea.

2. A broad legal continental shelf, not less than 200 miles wide, and not necessarily with the same limits as the territorial sea, is desired. There is some coolness toward a precise definition of its limits.

3. No changes appear envisaged with regard to the existing regime of the high seas, but there is considerable sympathy for the elaboration by the future conference of rules regulating the conduct of states in this area of the marine environment.

4. Finally, there is strong support for the creation of an international regime, including institutions, for the seabed and its resources beyond national jurisdiction. The institution envisaged would administer the area, manage, and perhaps directly exploit its resources on behalf of the international community, with financial benefits going primarily to poor countries. In addition, the institutions would exercise some powers with regard to scientific research and the prevention of marine pollution arising from activities on the seabed.

Although few states subscribe in full to the two basic positions which I have outlined, it is clear that there are two basic currents of opinion among coastal states represented in the U.N. Seabed Committee. The first takes a cautious attitude toward changes in existing law of the sea and seeks to preserve the maximum possible area of the marine environment open to the freest possible use and exploitation, while the second wishes to enlarge as much as possible the area of ocean space subject to comprehensive coastal state jurisdiction and regulate as far as practicable the uses and exploitation of the remainder.

Two questions arise: can the two currents of opinion be harmonized? If they are harmonized and the future law-of-the-sea conference approves the resulting accord, what are likely to be the consequences in terms of international community interests?

As for the first question, it is worth noting that the two approaches are not as imcompatible as they would appear to be at first sight. In the first place, both approaches are firmly based on two assumptions: the sovereignty or sovereign rights of the coastal state within the area under its jurisdiction and freedom of the seas, as distinguished from the seabed, in the area beyond. Second, opposition to a drastic expansion of coastal state jurisdiction in the oceans would diminish if a way were found to guarantee freedom of navigation within the enlarged area of comprehensive coastal state jurisdiction and would virtually disappear if, in addition, some arrangement could be reached with regard to fisheries. Third, if satisfactory arrangements are reached with regard to navigation and fishing, there are indications that agreement could also be reached to establish an international agency with the power to administer the seabed and its resources beyond a wide legal continental shelf on behalf of the international community, provided that freedom of access to, and use of, the superjacent waters remained substantially unimpaired and provided that, within the agency, there is established a voting mechanism that adequately balances the principle of one state/one vote. Eventual agreement on the issues to which I have referred appears far from impossible also because the great majority of coastal states have very stong interests in avoiding the extremely serious consequences of failure of the future conference to make decisions on the major issues with which it will have to deal.

Already some concrete concepts have been put forward which, if further developed, could form the basis for a general agreement among coastal states on major issues. One is the principle of "custodianship," by which, if I understand it correctly, the coastal state, as custodian of international interests, exercises comprehensive powers over a broad belt of ocean space adjacent to its coasts within a framework of internationally elaborated norms.

Another proposal put forward this year by Venezuela on behalf of the majority of Caribbean countries would retain a 12-mile territorial sea and then recognize, to the coastal water, sovereign rights over the living and nonliving resources of a broad belt of ocean space adjacent to its coast, not exceeding 200 nautical miles in breadth, called the patrimonial sea. Within the patrimonial sea, there would be freedom of navigation and overflight and freedom to lay submarine pipelines and cables; on the other hand, scientific research and nonextractive uses of ocean space would be subject to the consent of the coastal state.

Although both the Canadian and Venezuelan proposal leave a number of important problems unsolved, such as passage through straits between 6 and 24 miles wide presently open to international navigation, and although they are not sufficiently satisfactory to distant-water fishing nations, nevertheless, they have been received with considerable interest in the Seabed Committee. I consider it entirely possible that the concept of a broad patrimonial sea, somewhat modified in the direction of the Canadian views and perhaps incorporating Soviet and Australian proposals to the effect that foreign vessels would be permitted to fish under reasonable conditions within the patrimonial sea when nationals of the coastal state are unable to harvest the entire allowable catch, might well form the basis of a conference compromise. As for international straits, it is possible that major maritime nations would be satisfied with a redefinition of the concept of innocent passage that would guarantee their vital interests.

There are several indications that a compromise on the general lines indicated is possible. Thus, the representative of Canada, Mr. Beesley, speaking in the Seabed Committee in August 1972, stated, "It has been the Canadian view for some years that an accommodation is possible between major maritime States and those coastal States asserting certain forms of limited jurisdiction beyond 12 miles. The essential elements of an accommodation of this issue have always been, in our view, twofold: on the one part acceptance by coastal States of a relatively narrow territorial sea beyond which they would assert only certain limited forms of jurisdiction...falling short of complete sovereignty and allowing, for example, freedom of passage and freedom of overflight...and on the other part, acquiescence by the major maritime powers in these assertions of limited forms of jurisdiction by the coastal States in question."

At the same session of the U.N. Seabed Committee, the representative of the United States, Mr. Stevenson, stated, "we are prepared to agree to broad coastal State economic jurisdiction in adjacent waters and seabed areas beyond the territorial sea as part of an overall law-of-the-sea settlement.

However, the jurisdiction of the coastal State to manage the resources in these areas must be tempered by international standards...." Later in the same statement, Mr. Stevenson indicated that the international standards to which he referred related to: (a) unreasonable interference with other uses of the ocean, particularly navigation and overflight; (b) protection of the ocean from pollution; (c) protection of the integrity of investments; (d) sharing of revenues for international community purposes from the exploitation of seabed minerals; and (e) impartial procedures for the settlement of disputes.

Countries which have already extended their sovereignty to 200 miles from the coast and supporters of the concept of the patrimonial sea have responded vaguely, but not necessarily negatively, to Mr. Stevenson's suggestions. No doubt there will be prolonged and hard bargaining, but, as I have already suggested, the chances of an eventual accord that would receive the required two-thirds majority at the future conference are by no means hopeless.

The probabilities are that the conference will not protect as many international interests within the patrimonial sea as desired by the United States; however, let us assume that the desires of the United States are met in full and that, in addition, there is created an international agency to license seabed exploitation beyond the patrimonial sea and to distribute equitably the revenues received from licenses. Will the new regime of the oceans then be viable?

There is no question that granting to the coastal state comprehensive economic jurisdiction over a broad ocean belt adjacent to its territorial waters would be better than failing to agree at the future conference and might well relieve immediate international tensions and immediate occasions for conflict. It would also, in theory, permit conservation and rational management of most fishery stocks. The new agency will no doubt perform most useful functions in setting standards for the exploitation of the deep seabed, in providing reasonable security of title, and in compensating to some extent those countries that are either landlocked or that are unable to participate directly in seabed exploitation.

But, unavoidably, such a solution unaccompanied by more basic changes in international law would have serious medium-term consequences and is highly unlikely to be viable.

Under the package deal outlined, the coastal state will inevitably subject scientific research by foreign nationals within its patrimonial sea to increasing restrictions as its exploitation of ocean resources intensifies. The fragmentation of a major portion of ocean space between nearly 100 different national jurisdictions will further increase the difficulties of conducting scientific research. This will be highly unfortunate since, with the development of new technologies and with increasing use and exploitation of ocean space, scientific research becomes the vital prerequisite to ocean space development.

Experience with articles 24 and 25 of the 1958 Geneva Convention on the High Seas and with international practice suggests that pollution standards incorporated in an international treaty are unlikely to be effectively observed by the majority of the international community, many members of which indeed lack the means to enforce much observance. Nor would reference to IMCO, to the new U.N. Environmental Secretariat, or to another U.N. specialized agency be likely to improve significantly the changes of observance of any treaty-defined international pollution standards.

Nor is it likely that interference with navigation and other uses of the ocean could long be prevented in the patrimonial sea as the coastal state gradually increases and diversifies its own uses of this area.

As for fishing, it should be remembered that only a relative handful of nations have implemented an effective policy for conservation of fish stocks within presently claimed conservation zones, and none, so far as I know, has legislation providing for effective management of all commercial fish stocks within its jurisdiction. To propose, as has been proposed with some variations in detail, by the United States, the Soviet Union, Canada, Australia, New Zealand, and others, that "the coastal state may annually reserve to its flag vessels that portion of coastal and anadromous resources as they can harvest," leaving conservation and management of fishery resources essentially to the discretion of coastal states, supplemented by such assistance as the meagre resources of FAO can provide, is to run the serious risk that fish stocks in many parts of the world will be pillaged for short-term benefits as fishing capabilities increase.

Mr. Stevenson rightly observed in his speech that "effective assurances that standards will be observed is a key element in achieving agreement" and that therefore there must be arrangements for impartial procedures for the settlement of disputes. No doubt such procedures will be incorporated in any final agreement, but can they be effective if there exist no forum nor institutions give some credible assurance that states will normally submit to the agreed dispute settlement procedure even when it is not necessarily in their interest? Almost every day we see states refusing to submit disputes to impartial settlement, even when they are parties to the statute of the International Court of Justice. The 1958 Geneva Convention on Fishing contains elaborate procedures for the impartial settlement of disputes, but these have remained a dead letter even for nations to the Convention.

Even more importantly, the concept of a wide economic zone under comprehensive coastal state jurisdiction as presently proposed, and whatever limits are agreed upon, will not prevent states from further extending their jurisdiction in ocean space in accordance with their perceived interests as technology advances, as uses of the sea diversify, and as exploitation intensifies. Thus agreement on the international recognition of such a zone can be a halfway station toward almost total disregard of international community interests in ocean space with extremely grave consequences for international order and for the beneficial use of ocean space.

While some chances of success still exist, we must therefore aim not merely at obtaining an agreement which will temporarily satisfy the majority of coastal states but at the creation of a new international order of an institutional character in ocean space which equitably balances the vital interests of states rich and poor, coastal and landlocked, and national interests as a whole, with the growing interdependence of regions and of the world. Ocean space and its resources, in short, must be recognized as a common heritage of mankind in which states may exercise, not sovereignty, but those jurisdictional rights which are necessary for the protection of important national interests in a fragmented world torn by conflict.

If this concept is accepted, everything falls into place. There would not be an agency for licensing seabed mineral exploitation beyond national jurisdiction and for equitable distribution of net revenues. Instead, the future conference would create a new institutional system parallel, but not subordinate, to the United Nations with general competence over ocean space as a whole and with the more specific function of preserving the balance between national and international interests determined by the conference, of managing the living and nonliving resources of the ocean beyond national jurisdiction, of promoting the harmonization of national laws relating to ocean activities and generally of providing such international community services and such assistance to states as may in future be found to be necessary or desirable. I do not conceive of this institutional system as an immense international bureaucracy imposing its will on states, but rather as a relatively simple mechanism, incorporating incidentally those parts of the U.N. system already dealing with some technical aspects of ocean problems such as IOC, IMCO, and Fisheries Department of FAO, that would ensure to states a beneficial use of the sea not otherwise attainable, that would ensure that the oceans are not grossly abused and that ocean technology is not used in a manner that can have grave detrimental effects on the marine environment.

The new international order in ocean space, which I would wish to see created, would be based on certain fundamental assumptions:

First, the ocean space, its uses and its resources, are becoming increasingly vital to the world with advancing technology, multiplying populations, intensifying industrialization and gradual depletion of the land-based sources of some minerals.

Second, that in this developing situation no state, however powerful, can by itself effectively and with certainty protect its own interests except at a politically prohibitive cost. Interests of states can, in future, be protected effectively only through the mobilized weight of the clear preponderance of power and of international opinion organized in international institutions.

Third, since humans can now cause extreme changes in the natural state of the marine environment, the use of technological capability in ocean space requires a minimum of regulation.

Fourth, multiplying uses of the ocean require harmonization over ever wider areas; seldom can this be achieved effectively by coastal states acting individually.

Fifth, the living resources of the sea increasingly will require scientific management to meet the needs of growing populations. Effective management cannot be provided merely by enlarging coastal state jurisdiction and continuing the present system of intergovernmental fishery bodies.

Sixth, ocean mineral resources are immense and hard mineral resources are virtually inexhaustible. But if they are appropriated or exploited on a large scale by a small minority of countries, the consequences both economic and political could be very serious indeed.

Thus the new international order for ocean space would have two basic purposes: the safeguard both of national and international interests in ocean space and, second, a full utilization of contemporary scientific and technological advance through rational management of ocean space and equitable development of its resources for the benefit of all countries.

In this context, a broad belt of ocean space subject to the economic jurisdiction of the coastal state would not be objectionable since there would exist strong and comprehensive international institutions, including compulsory judicial mechanisms, (a) to set standards and prevent abuses of the sea that could provoke unilateral extension of jurisdiction, (b) to enforce implementation of agreed norms of resource management, (c) to assist members of the international community to meet these norms, and (d) to provide a forum for the discussion and solution of all marine problems that might lead to conflict.

The comprehensive institutions which I envisage would exercise powers of administration, management, and regulation that have not yet been granted to any existing international organization. States naturally will wish to be assured that these powers cannot be used in a discriminatory fashion or in a way that might seriously prejudice what are considered to be vital national interests. Furthermore, states must have reasonable assurance that there will be general compliance with the decisions taken by the institutions. This suggests that the latter must be endowed with powers sufficient to exercise their functions, that no one state should be able to prevent the making of decisions. Further, the institutions cannot be allowed total discretion in the legal exercise of their powers, and, finally, to give credible assurance of compliance with their decisions, the institutions should be able to act only with the concurrence of the clear preponderance of world opinion measured in terms of population, power, and technological capability rather than in terms of numbers of states.

This latter consideration suggests that agreement must be reached on some novel mechanism for the equitable balance of interests and voting power. Balancing devices used in the U.N. system are not suitable: a two-thirds majority can be achieved in the United Nations by a combination of states

representing less than 20 percent of world population and negligible power to enforce decisions. A distinction between technologically advanced and less advanced countries is almost irrelevant in the ocean context. The International Bank system of voting power in proportion to shares held is also inappropriate. The principle of one nation-one vote must be safeguarded for political reasons; on the other hand, it is essential to give due weight to important maritime interests. I have proposed a somewhat novel system by which each state would have one vote, but states would be divided into three categories. In the first category would be coastal states having a population of more than 100 million or possessing six out of nine qualifications directly related to maritime capability. In the second category would be all other coastal states. Landlocked countries would belong to the third category. Most decisions would require the support of a majority of states in the first category and of a majority in one of the two other categories. Very important decisions would require the support of a majority in all three categories.

Are comprehensive institutions such as I envisage necessary? There can, I think, be little doubt on this point. Technological capability has reached the point where its use must be effectively regulated: a 447,000-ton tanker with a 92-foot draft cannot be permitted to roam the ocean as it pleases. Perhaps we can no longer leave determination of the maximum size of vessels to private economic considerations alone. The use of nuclear energy in the oceans, as on land, can be dangerous if standards are not established and effectively enforced, as the Atomic Energy Commission does in the United States. Intensive development of ocean resources will soon become vital for the continued viability of our economic system, but resources will become a source of desperate conflict if we limit ourselves only to enlarging coastal state jurisdiction, and resources require management both within and outside national jurisdiction. Scientific research will suffer without comprehensive international institutions, and so on.

It is believed by some who recognize that ocean problems are multiplying that the study and solution of these can be assigned, as appropriate, to existing agencies within the United Nations family or can be solved on a case-by-case basis by the negotiation of international agreements. This is a dangerous illusion. The route of international negotiation is far too slow and uncertain.

As for fragmenting competence over ocean problems among one-and-a-half dozen U.N. agencies plus an agency dealing with seabed minerals, I would only make two comments. Our uses of the sea are increasingly interlinked, fragmentation of competence will result in lack of ability to achieve solutions, and, furthermore, solutions of ocean problems will become entangled in those problems of coordination between rival agencies and competing jurisdictions which already plague the U.N. system. Second, U.N. agencies have only advisory functions and technical competence, whereas the root of many technical ocean problems, as in the field of fisheries, is not technical but part economic and part political. What is required,

are institutions capable of dealing effectively with the economic and political substratum of apparently technical problems. I would add that only strong and comprehensive institutions can, in contemporary circumstances, guarantee international interests and an impartially regulated freedom of the seas.

It is uncertain whether comprehensive ocean space institutions can be realistically envisaged. Some states certainly consider them utopian at the present time. Yet if these institutions are seen to be, on the one hand, the only hope that the majority of the developing world has to share significantly in the benefits to be obtained from the development of ocean space resources and, on the other hand, the only sure guarantee of legal order and maximum feasible freedom of the sea, it is not impossible that they will be established.

Limited coastal state jurisdiction within a wide belt of sea adjacent to its coast, regulated freedom of the sea beyond national jurisdiction, and strong comprehensive international institutions, including binding adjudication of disputes, are the three pillars on which the new order in ocean space must rest. And the concept of common heritage of mankind is its foundation.

Only thus can mankind avoid the threatening dangers and grasp the radiant promise of the contemporary scientific and technological revolution in ocean space. Nations can no longer afford to avoid the challenge to contribute within their capability to create a new cooperative world order in the oceans.

FISHERIES USES OF THE SEA

Public Policy Issues

A. T. Pruter
Deputy Director, Northwest Fisheries Center
National Marine Fisheries Service
Seattle, Washington

Characteristics of World Ocean Fisheries

Before describing some of the characteristics of world fisheries, I would like to say a few words about their importance to mankind. Fish are the most valuable commodity we extract from the world's oceans. In 1967 the value of the world fish catch was approximately $9 billion at the fisherman's level. The comparative value of petroleum production from the oceans in 1967 was $4 billion and the value of minerals from the seas was $50 million.

Besides their economic value, fish play an important role in satisfying man's food requirements. Fish fills the gap between starvation and subsistence for more people in nutritionally deficient countries than does milk or meat. About one-half the people in the world depend on aquatic foods for most of their animal protein intake.

The character of fish and other living resources of the seas presents a unique opportunity and challenge to man. Since they are living, they are renewable. Each produces a surplus of production every year over that required to maintain it as a viable species. The opportunity is, therefore, to harvest this surplus, which would otherwise be lost to man, and to use it to meet man's needs for food, employment, and recreation. The challenge is to protect the living resources from overfishing and from environmental degradations. In contrast to the living resources, nonliving resources like petroleum are nonrenewable on a useful time scale. The rate at which they are extracted must be predicated on the knowledge that once exhausted, they are, to all practical purposes, lost forever to man.

GROWTH OF WORLD FISHERIES

It is informative to compare the rate of growth in world fish catch with the rate of increase in the human population. In the century between 1850 and 1950 the world fish catch increased from about 2 million tons to 20 million tons. By 1960, just 10 years later, the catch had nearly doubled to about 40 million tons and in the decade 1960 to 1970 it further increased to almost 70 million tons. Thus, in the period since World War II, production from world fisheries has grown at a rate of between 6% and 7% per year, or approximately twice the rate of increase in the human population.

CHANGING PATTERNS IN USE OF FISH

The use of fish as human food has not grown as rapidly as the foregoing figures on world production would suggest. This is because an increasing share of the total catch has been reduced to fish meal for use in feeding poultry and livestock. Historically, fresh fish was the largest single use until fish meal exceeded it about 1967. In 1938 fresh fish accounted for 53% of the world production and fish meal accounted for only 8%. By 1970 the comparative figures had dropped to 27% for fresh fish and increased to 37% for fish meal. Another increasing use has been frozen fish, which rose from practically nothing in 1938 to almost 14% of the world total in 1970. Since 1957 the fraction of the world catch processed as canned or cured products has fallen from about 30% to 20%.

The trends of changing use of fish have been remarkably constant since World War II and reflect the disposition of the world's fishery products among nations. The largest market for fish meal and frozen fish, which together now account for 51% of the world catch, is in developed countries; thus, the developed nations with relatively high dietary standards have received most of the benefit of increased fish production rather than developing nations where the need is greatest for increased supplies of animal protein.

REGIONAL PRODUCTION

Changing patterns in the use of the living resources of the seas are also shown by regional production since 1957, the period of greatest change. Since 1957, all continents have registered an increase in production, but the rate of increase by continent has differed greatly. Greatest increase was by South America, whose production grew from 1.6 million metric tons in 1958 to 14.8 million metric tons in 1970 and whose share of the world catch increased from about 5% to 21%. Most of this increase, however, was due to the phenomenal growth in the harvest of the Peruvian anchovetta, which in 1970 accounted for 83% of South America's total harvest and almost 18% of the world harvest. Most of Peru's catch of anchovetta is processed into meal and oil and exported to developed nations.

Production in Africa doubled from 2.1 million metric tons in 1958 to 4.2 million metric tons in 1970; however, Africa's share of the world total actually dropped from 6.4% to 6.0% between 1958 and 1970. Asia was the leading continent in fish production in 1958 and it still enjoyed first position in 1970. Fish production in Asia increased from 14.9 million metric tons in 1958 to 26.2 million metric tons in 1970, but its share of the world total fell from 45% to 38%.

Europe increased its production from 7.8 million metric tons to 12.0 million metric tons between 1958 and 1970, but its share of the world total fell from 23% to 17%. Production in North and Central America was the least changed, having only increased from 4.0 million metric tons in 1958 to 4.8 million metric tons in 1970. This represented a drop in its share of the world total from 12% to 7%. Production by the U.S.S.R. is now 1-3/4 times that of Africa and 1-1/2 times that of North and Central America. It grew from 2.6 million metric tons in 1958 to 7.3 million metric tons in 1970, which represents an increase from about 8% to 10-1/2% of the world total.

In 1970, Peru ranked first in production among the world's nations, followed by Japan, U.S.S.R., Mainland China, Norway, and in sixth place the United States. These figures on production by continent and by nation, however, do not adequately reflect the national patterns of fish consumption. For example, while the United States ranked a poor sixth among the fish-producing nations of the world in 1970 and its production has long been stable at between 2 and 2-1/2 million tons per year, it is the world's largest consumer of fishery products and that consumption has been steadily rising. The U.S. production is only about 3% of the world fish catch, but its people consume about 12% of the world catch. This is accomplished by importing fishery products from other nations: the U.S. is the world's leading importer of fishery products. Our nation's interest in maintaining the productivity of the world's fish resources is, therefore, much greater than our rather dismal record as a fish producer would suggest.

PRODUCTION BY KINDS OF FISH

Fishery production may be classified by three major categories: namely, marine fish, fresh water and diadromous fish, and invertebrates. Diadromous fish include salmon, shad, and other species which spend a portion of their lives in fresh water and a portion in the ocean. Invertebrates include such economically important shellfish as crabs, shrimp, oysters, and clams. The major change that has occurred in these three categories has been the increase in relative importance of marine fish. Between 1938 and 1970, the share of the world production increased from 72% to 77% for marine fish, fell from 17% to 14% for fresh water and diadromous fish, and remained relatively constant at about 8% for invertebrates. The balance of the world's production (excluding whales) is accounted for by aquatic

plants and miscellaneous items. Thus, marine fish has historically acounted for most of the world's fishery production and its share is increasing.

Within the marine fish category, pelagic fishes account for between two-thirds and three-quarters of the world total. Most of these pelagic fishes are harvested in waters over the continental shelf or upper continental slope in fairly close proximity to the land masses, rather than in strictly oceanic or high seas regimes. Among the pelagic species, herring or sardine-like fishes are the most important group. Production of herring-like fishes increased from 7-1/2 million metric tons in 1958 to over 21 million metric tons in 1970; however, much of the increase in production of these herring-like fishes has been from the great growth in landings of Peruvian anchovetta. In contrast to the Peruvian anchovetta, production of some of the long-fished pelagic species such as Atlantic herring, California sardine, and menhaden has actually declined; and production of some others, such as the South African pilchard and European sardine, shows signs of having passed its peak and is beginning to decline.

Among the demersal or bottom-dwelling fishes, the group that has shown greatest growth in production is the cod-like fishes. Production of this group increased from 4-1/2 million metric tons in 1958 to over 10 million metric tons in 1970. Biggest increases in the demersal fishes were registered by hake and Alaska pollock. However, within this group we also find that declines have occurred in the production of some major resources such as Atlantic cod, Atlantic ocean perch, Pacific ocean perch, and yellowfin sole of the Bering Sea. Demersal fish are generally more susceptible to overfishing than pelagic fish and the declining production of many demersal species reflects this fact.

One may roughly summarize the growth of fisheries in the last decade by saying that the major increases were in the production of herring-like fishes, mostly anchovy for conversion to fish meal, and of cod-like fishes, mostly hake and Alaska pollock, for direct use as human food.

WORLD FISH POTENTIAL

At the end of the last century, such famous scientists as Huxley stated that the supply of fish from the oceans was inexhaustible; however, subsequent experience and research have shown that the resources are indeed finite and that overfishing can lead to depletion with a consequent rapid decrease in commercial yields.

During the past 20 years or so, scientists from many countries have attempted to evaluate the biological productivity of the world's oceans. Their evaluations have been based on three different approaches:

1) Extrapolation of present trends in fisheries production.

2) Extrapolation of resource estimates from a known area or areas to the whole world.

3) Estimation of primary production and the production at each successive stage in the food chain.

Variation between the different estimates has been great. Suffice it to say that for marine fish and shellfish, the estimates of potential annual yields have ranged from about 100 million tons to 2,000 million tons. FAO currently uses a best estimate of around 150 million tons for potential world production based on the continued use of existing harvest technology and familiar species. If we were to develop radically new harvest technology and turn to unfamiliar species, the world production conceivably could reach 400 to 500 million tons per year before expansion costs became excessive.

To increase production to even 150 million tons, however, will require that we do several critically important things:

1) Manage existing fisheries to prevent overfishing. Our record in this area is deplorable at the present time.

2) Increase our utilization of the more abundant pelagic species. This will require moving down the food chain to utilize small fish, thereby decreasing our reliance on the larger apex predators to supply much of the harvest.

3) Eliminate institutional constraints which restrict harvest efficiency.

According to projections by FAO, the world demand for fisheries production will reach 106 million metric tons by 1985. This would require an increase of some 36 million tons over the amount produced in 1970. This seems to be an attainable goal in relation to the predicted potential of the world's oceans. While the 106 million tons is within reach on a global basis, it should be noted that it can be attained only at the expense of great regional imbalances. In meeting this increased demand, it seems likely that the gap between the production by developed and developing countries will widen rather than shrink. In other words, continuation of present conditions as regards opportunities for fisheries development may enable the developed countries to fulfill their needs for fishery consumption in 1985, but it will be impossible for developing countries to meet their needs.

COMPETITION FOR RESOURCES

I am sure that other speakers will have more to say regarding this disparity between the fisheries production of developing versus developed nations. Much of the disparity is due to the basic difference in the character of the fisheries by the two types of nations. Since World War II, there has been a radical change in the nature of the world's fisheries. Prior to the war, fishing by all nations was largely carried out in home or near-home waters. In contrast to the prewar situation, many of the developed countries now deploy large fleets of factory vessels to roam the world's oceans in search of exploitable fish stocks. Such operations have brought distant-water fishing nations into direct competition with coastal fishing nations when many of the emerging coastal nations are looking to the ocean waters off their coasts to help satisfy their needs for food and an improved standard of living. From the coastal state's standpoint, the existence of foreign fleets off its shores can create a multitude of problems. These problems may generally be classified as:

1) Preempting of resources and fishing grounds by the foreign fleets.

2) Destruction of, or interference with, fishing gear employed by smaller coastal fishing vessels.

3) Depletion of resources.

4) Pollution of coastal waters.

I would like to end this talk on a happy note, but gazing into my crystal ball suggests that, given a continuation of existing conditions, conflicts over fisheries resources will get worse rather than better in the coming years. Such conflicts usually lead to depletion of resources and a reduction in available food supplies--a situation that will become more intolerable as the world's population increases. The forthcoming Law of the Sea Conference is a great opportunity to bring some order to the world fishing scene. I look forward to hearing what subsequent speakers at this conference have to say on this subject.

FISHERIES USES OF THE SEA

Public Policy Issues

William T. Burke
Professor of Law
University of Washington
Seattle, Washington

International Fishery Policies in Law of the Sea Negotiations

The purpose of this conference is to consider resolutions proposed by various nations for law of the sea problems that will be dealt with by the third Law of the Sea Conference to be convened probably in the next 12 to 18 months. There are quite a few speakers on this program representing a variety of viewpoints on fisheries issues. The point of view I would like to assume is that of considering what goals should be sought for the general community of states with respect to questions of allocating authority over fisheries, including the authority to manage the fisheries and the authority to decide upon the disposition of areas or resources or benefits. I am not suggesting that it is illegitimate to look at these questions from the viewpoint of a single nation or industry or fishery or geographical area. Obviously these approaches are entirely appropriate and equally legitimate. However it is useful to ask where man as a collective group ought to be heading in fisheries matters and whether contemporary proposals are adequate for achieving these objectives. It is as appropriate to ask how the group as a whole fares in such negotiations as it is to ask how individual components may gain or lose.

I would begin by a very brief general characterization of some of the fisheries proposals being mentioned. This will be followed by identifying some specific goals for fisheries management in the context of the Law of the Sea negotiations. After identifying each goal a brief assessment is made of the relationship of the various fishery proposals to this goal, if any. It must be emphasized that the problems involved here are enormously complicated and that this discussion does little more than suggest a way of assessing the usefulness or desirability of some proposed solutions to these problems.

THE FISHERIES PROPOSALS

The proposals regarding fisheries thus far tabled or mentioned in the Law of the Sea negotiations exhibit a wide range between the extremes of coastal authority and continued complete freedom of fishing.

The coastal state position is characterized by demands for subjecting fisheries adjacent to the coastal state to the control of the coastal state. An extreme view is that this control may be obtained simply by extending the territorial sea to 200 or more miles. A less extreme view calls for creating an exclusive economic resource zone beyond a 12-mile territorial sea to 200 miles within which the coastal state controls all resources including living. A still less extreme view is that which avoids the creation of any zone as such but permits the coastal state to regulate fisheries by species and to obtain a preferential right to all or some fisheries while maintaining or continuing some part of the distant water fisheries in these waters.

The other main contending view is that of the distant water fishing states, i.e., states which do a very large part of their fishing off the coasts of other states. This position is characterized by an attempt to insulate distant water fishing to a maximum degree from any regulation by coastal states or from any allocation of fisheries to such states. The two largest distant water states are the U.S.S.R. and Japan, although there are numerous other states, including some developing nations, having distant water fisheries. As others have emphasized, the U.S. position is complex because our fishing interests cover a spectrum. Tuna and shrimp are the principal distant water fisheries of the United States. Although they are by volume a relatively small part of the total U.S. catch, these species (plus salmon) are a substantial percentage of U.S. catch by value.

GOALS

A. The preservation of minimum order or the avoidance of violent conflict

1. Statement of goal

When one reviews fishery disputes and questions since World War II it is evident that these have not, in general, led to violence as a means of resolving them. It does not seem to me that conditions will change in the future so that people will expect force will be used to resolve fishery disputes.

However there is still a point in suggesting that avoidance of violence is a goal to be sought in considering fisheries proposals in Law of the Sea negotiations.

The principal way fisheries issues at the Law of the Sea Conference bear on the use of violence concerns the possibility that failure to agree on fisheries might trigger the failure of the conference to settle other vital issues such as the breadth of the territorial sea. It may be recalled that these two issues were closely tied together at the 1958 and 1960 Law of the Sea Conferences and the inability to settle the fish problem (namely the extent and degree of coastal authority over fisheries beyond the territorial sea) had the result of also preventing agreement on the breadth of the territorial sea. If this should happen again, the consequences might be much more serious since so many other problems are involved. It is not at all beyond imagination that this failure would spur many exaggerated unilateral claims to territorial sovereignty over the ocean and that violence would be employed to uphold and to resist these claims. From this perspective it may be seen that the capacity of the system to resolve fisheries problems may be important for other more significant matters as well.

2. Relationship of proposals to goal

The question is whether any of the fisheries proposals now outstanding can attract sufficient support for adoption and widespread acceptance. None seem that attractive presently and so the problem is whether any can be modified to attract such sufficient support. My own view is that the need is to suggest modifications to proposals of an economic resource zone which assist in realizing some of the goals later identified. Unless this question can be settled, the conference may again fail to agree on other associated questions including the width of the territorial sea and rights of passage. Such failure definitely poses serious risks of violent conflict.

B. Increasing the effectiveness of international institutions in ocean management

1. Statement of goal

The ocean and the atmosphere are the two largest physical features of this planet and they are capable of being shared by all mankind for numerous activities. However, developments in science and technology are shrinking even these enormous regions so that conscious coordination and regulation of activity therein are becoming more and more necessary. Such coordination and regulation are more likely to be achieved if states confer the necessary authority upon an international institution than if authority is mostly decentralized and exercised through the 118 coastal nations of the world. Accordingly, one goal for fishery regulatory efforts is to contribute to the strengthening of international institutions and to reduce the authority of individual nations to regulate fisheries.

2. Relationship of proposals to goal

It is an understatement to say that this goal is far from the minds of any proponent of the fishery proposals mentioned here. All of those who advocate greater rights for coastal states, including the United States, have turned their backs on existing agencies and on improved or new agencies. It is true that in major respects the international fishery regulatory bodies have been ineffective but the reasons for this can be traced directly back to lack of support from the states composing them. The evident strong trend toward coastal state fishery management reflects the unwillingness of states to engage in effective international cooperation in managing fisheries.

It may be asked what difference it makes--if states will not permit international institutions to be effective, then why not use coastal states for management? It is true that only coastal states are available if international means are rejected. I strongly suspect, however, that this alternative may turn out to be the least desirable choice on a worldwide basis. The gains from coastal management and exclusive rights are very likely to be less than the costs involved in exerting effective management and in exercising enforcement measures to exclude and to supervise foreign fishing. The states of West Africa and Southeast Asia, in particular, may well discover that the burdens of going it alone as a coastal state vastly exceed the benefits supposedly available from exclusive resource zones. In the result it may turn out that numerous coastal states will discover that genuine international cooperation through regional institutions is the most effective and immediately available means of accomplishing management of marine fisheries.

C. Enlarged economic benefits from fisheries

1. Statement of goal

Probably not many would advocate that fishery regulation should aim primarily at enhancing the welfare of fish or at safeguarding the bureaucratic interests of government officials. The ultimate aim of fishery regulation is to improve the lot of people, and primarily (but not solely) of the people who endure the hazards of fishing or of investment in the fishing industry. On most occasions, but not all, the maximum contribution to this end is achieved by increasing the net yield which can be secured by catching and selling fish. This net yield itself is most likely to be enhanced by lowering the cost involved in catching the fish, but obviously other measures are relevant including those promoting use of unexploited species. The overall general interests of the community are promoted when resources are not unnecessarily devoted to fisheries which could be employed to meet other human needs.

This particular goal is becoming more and more significant on the international level, but it would surprise me if it were expressly sought at the next Law of the Sea Conference as a major objective of participants except in connection with fishing limits. With respect to management generally, it would be desirable if any international arrangements resulting from the conference did not pose a barrier to seeking this goal. But I suspect it is asking too much to expect that maximum economic yield will be enshrined explicitly as an international fishery management goal.

2. Relationship of proposals to goal

Generally speaking this community goal has not been mentioned much in the Law of the Sea context. It appears to be taken for granted, if it is thought about at all, that creating exclusive rights for coastal states by one means or another is synonymous with increasing economic benefits from fisheries. This belief has no foundation whatsoever even for a single coastal state. The experience of the United States is perhaps as good as any to demonstrate that a group can have full jurisdiction over a fishery without being able to provide for increasing the net economic benefit to be derived therefrom.

Of the various written proposals only the Canadian working paper addresses this question:

> (2) Access to a fishery should be controlled, on the basis of some appropriate formula, to ensure that no more than the maximum biological yield is taken, and that it is taken without unnecessary investments of capital and manpower.
>
> Controlled access is, of course, an obvious consequence of any system of share allocation. The objective of rational fishery management should be to constrain the productivy capacity in a fishery, by controlling access, so that the yield is taken with no greater effort than necessary, taking into account, however, relevant social factors. This concept may be extended, and it could be envisaged that economic rationalization of fisheries would include the objective of obtaining maximum economic yield from the resource. This would mean that fisheries would be exploited so that the difference between value of the yield and cost of obtaining the yield is at a maximum. This objective can usually be attained by fishing at a point slightly below the maximum sustainable yield. Indeed there are some situations where the fishing effort required to reach the maximum sustainable yield may be out of all proportion to the increase in catch so attained.
>
> While the application of a policy of this kind is especially difficult in the case of fish stocks exploited by fleets of different nations, a reasonably satisfactory solution would be to establish an overall catch limit, with shares allocated to participants. With assurance of a predetermined share in the catch, each country is in a position to utilize that share to the best advantage in terms of its particular

social goals. In the view of the Delegation of Canada, the coastal state should have the authority to determine the allowable yield for the various stocks of coastal species falling under its management, in accordance with the principles herein outlined and in consultation with regional advisory commissions. It is because international experience has demonstrated the difficulty of reaching consensus on particular measures needed on the basis of scientific data that it is proposed that the coastal state should have authority to impose a decision where consensus is not possible.

D. Wider distribution of benefits of fishery exploitation

1. Statement of goal

It is not at all inconceivable that nations will begin to raise some hitherto muted questions about the distribution of benefits from world fisheries. As is generally known, the developing nations of the world (the lesser developed countries) are making a determined effort in the United Nations to acquire a share of the benefits to be realized (some day) from the mining of minerals in the deep sea beyond the limit of national jurisdiction. This goal finds eloquent expression in the concept that the seabed and its resources beyond the limits of national jurisdiction are the "common heritage of mankind." The notion is that all states should share in the income or benefits produced by exploitation of the area even if they do not themselves participate in the actual production.

The point I am making is that it does not yet seem to have been widely noticed that the economic activity called fishing is responsible for a larger gross value of production than that available from oil, gas, and hard minerals. When this fact is noticed there may be a demand that the benefits of this activity also be shared as part of the "common heritage of mankind."

Of course this notion of "common heritage" is only one means, and not an overly plausible one in connection with living resources, of improving the distribution of benefits from fisheries. It is possible to achieve a wider distribution by enlarging the area subject to coastal jurisdiction and by providing that the coastal state can take part of the proceeds of foreign fishing in this area. This method obviously has defects since it would permit even the rich coastal states to take a share of the proceeds and thus not really spread the benefits very much. Furthermore any system which benefits only coastal states will exclude the large number of land-locked states who will, in contrast, share in the proceeds of mineral production from the international seabed area.

2. Relationship of proposals to goal

Thus far the principal means mentioned for seeing that the benefits of fisheries are made available to a larger group of states is by providing for enlarged coastal authority including exclusive or preferential rights to catch a share of the yield. There has been only slight mention that a coastal state might gain by selling the right to fish rather than itself engaging in fishing. Of the written proposal only the Canadian contains such a concept. This idea of selling access to a fishery is attractive especially because the coastal state might limit access by foreign vessels, thus permitting more efficient (less costly) fishing by them and adding to the value of the fish being caught. Then the coastal state is in a position to benefit from charging the foreign fishermen for the enhanced value of the right to fish.

Seen from this point of view the exclusive reliance on a method which induces the coastal state to engage in fishing is to be regretted. It may make no sense whatsoever for a particular coastal state to invest in catching fish since such investment may turn out to be a total loss, or, at least, less productive than an alternative investment in other activities. It may make, and in some conditions undoubtedly would make, far more sense for the coastal state to reap the benefits of foreign fishing by taking part of the catch itself for local use or export or by securing part of the value of the foreign catch.

E. Increased production of protein

1. Statement of goal

In a world plagued by maldistribution of protein, it seems likely that enlarging the supply is a reasonable goal and that increasing the production of animal protein from the sea is desirable. The assumption is that if the total amount available is enlarged the chances are better that increased portions will go to those in need of it. This may not be true, of course, but the conditions determining distribution and consumption frequently have little to do with the ocean. It remains desirable policy therefore to seek this increase under circumstances that are favorable to distribution to protein-short areas.

This goal may be contrasted to that of decreasing the yield of animal protein from the sea. Measures having such effect are not in the common interest. Proposals for fishery regulation should, at least, be able to pass such a test of desirability. It is to be questioned, from this perspective, whether expanding exclusive fishery limits is acceptable community policy. To the extent that such expanded limits act as a deterrent to expansion of fishery efforts by developing states needing protein, or restrict their continuing efforts and those of others, they contravene the common interest in increasing animal protein production from the sea.

2. Relationship of proposals to goal

The main problem here has been to assure that the extension of coastal state jurisdiction and preferential rights do not unreasonably prevent foreign fleets from access to fisheries made subject to coastal jurisdiction and rights. The Kenyan and the Caribbean proposals tabled at the Law of the Sea preparatory meetings do not provide any assurance that resources not utilized by coastal states can in fact be taken by foreign vessels until such time as the fishing capacity of the coastal state can take the excess yield. The U.S. draft articles contain an explicit provision for foreign access to coastal and anadromous resources where the coastal state does not fully utilize available resources. This is especially important because this would protect the U.S. shrimp industry off the coast of South and Latin America and because it would allow access by U.S.S.R. and Japanese vessels in the North Atlantic and Pacific where fishermen do not fully utilize the available fish. This is most significant in the Pacific where the United States and Canada currently take only a tiny fraction of available fish.

F. Maintenance of physical field from the ocean

1. Statement of goal

There is hardly anyone who is prepared to argue that a fish stock should be exploited to the point that it is unable to reproduce itself and maintain a fishery. Although argument has been made that this policy should in fact be implemented with respect to some species or stocks, it is not commonly regarded as a desirable general goal at least as an original proposition. Where costs of rehabilitating a stock exceed the benefits then, of course, there would be justification for commercial destruction of a stock. Accordingly, with the latter exception, a minimum policy concerning physical yield is to avoid measures which permit this eventuality to occur.

There is more and more doubt attending the desirability of policies which are formulated in terms of maximum sustainable yield (MSY). It is more widely recognized now than ever before that a fishery regulated solely with this aim may still be in very dire trouble and that far different regulation is required. Indeed the only real defense that can be made of this goal of management is that it may be a means of permitting still other goals to be achieved. It is more and more frequently recognized that MSY serves an important political purpose: indeed this purpose is perhaps its primary significance. But as an independent management goal, the MSY leaves a great deal to be desired. What is required, instead, is focus upon the objectives which MSY is said to promote or to facilitate. It is not suggested that these objectives are indefensible, merely that MSY is meaningful primarily in terms of such objectives and as a quantity by itself is nearly meaningless.

2. Relationship of proposals and goal

There has been much less emphasis on this management goal in present Law of the Sea negotiations than previously. This is mainly because the genuine issues of management are more clearly identified than before and it has been made clear in this process that the more important issue is that of allocating benefits of fisheries rather than protecting fish as such. It may be that in the end the Law of the Sea Conference will endorse MSY as the principal goal of fishery management.

If this is the sole accomplishment of the conference on the fisheries problem, it will undoubtedly be considered a failure.

CONCLUSION

In sum, I believe the major tendency concerning fisheries in the Law of the Sea negotiations thus far is most unfortunate. The majority of nations emphasize the goal of enlarging the authority of coastal states either by creation of a very large exclusive zone or by other means. Enlarging fisheries zones will not by itself resolve fisheries problems; it will contravene such goals as improved management institutions and increased production of protein; and this approach does not assure either the enlargement of economic gain from fisheries or even maintenance of yield. Acceptable fisheries arrangements should facilitate, not complicate, international institutions and should make provision for continued rational increase in fishery production around the globe. Thus far the problem of assuring a wider distribution of benefits from fishing has only begun to be approached and very little has even been said about increasing efficiency.

These conclusions relate only to the current state of affairs. The negotiations are still in their infancy and the opportunity still exists to influence developments in the direction of a greater approximation to widely shared goals.

FISHERIES USES OF THE SEA

Public Policy Issues

James A. Crutchfield
Professor of Economics
University of Washington
Seattle, Washington

Let me start with some fundamentals leading up to the question of the allocation among different countries of fishery resources. First, I start with the assumption that stems directly, I think, from Dr. Pruter's discussion, that most of the valuable marine fisheries either are subject in some degree to management or will require management in the near or distant future. As we come to the point that further extension is not possible, it becomes even more critical that we use fully and wisely the resources that we do have available. For both analytical and good historical reasons, I think we can be sure that unless management is undertaken as that time of pressure emerges, we will destroy at least some of the potential those stocks can yield. I also argue that allocation, the way in which we divide up the valuable benefits that marine fisheries can provide, is critical for the success of any international management program or regime. The fishing fleets of the world are not out there for fun, they are out there for profit, they are out there because of employment opportunities that are very important to them. They are out there in some cases because their very existence, in terms of food, or for an exchange may depend on that participation. The way in which we divide up the pie is at least as important to every one of those participants as the size of the pie itself.

I would argue also that no allocation system of any size will work except in conjunction with a management program that is solidly based on good data and sound scientific work. The two are simply part of a single process. Simply excluding all foreign fishermen from territorial seas or from the wider zones of economic control that are now being discussed provides no guarantee at all, either of protection of the productivity of the stocks themselves or of the economic well-being of the individual fishermen. It may work in that direction but will not work automatically that way unless it is accompanied by a good deal more in the way of sensible management.

There will be, I hope, recognition of the fact in the Law of the Sea Conference that there can be no single global system for management and division of the catch for the very diverse regional fisheries and regional fisheries structures that we find in the world. There are differences in national objectives for participation. To some nations involved, the net economic benefits that they can derive from the fishery are a prime consideration. For many of them, employment, particularly in the many cases where the relatively isolated coastal communities are heavily dependent on the fisheries, becomes a critical social consideration in their participation and management. For others, the urgency of protein food requirements may be a major matter of concern and for still others, the necessity of balance of payments stability may rest heavily on success in fishery participation.

The mix of these different objectives is obviously not the same for the developed and developing nations; it is not the same for any two nations in either of these categories. There are also differences that we must consider, not only in economic, but in social and if you will pardon the term, humanitarian terms, with respect to the dependence of people on fisheries. There are some extreme cases--the Icelandic case is as good as any, in which the very national life may depend on a regime in which Iceland can participate at a level that will maintain her population. Our own Northwest Coast of the United States, of Canada, and the Alaskan area are equally dependent on social considerations regarding who shall participate. There are also differences in the compatibility of small traditional in-shore fishing operations with the large-scale, highly mobile, modern distant water gear that Dr. Pruter referred to.

I think finally, as a sort of ground rule, we have to accept the view that for both sound reasons and some not so sound the dominant view of coastal state preference in some degree will prevail at the Law of the Sea Conference. If that conference fails to produce generally acceptable means of allocated catch, employment, and other opportunities among nations, they will be unilaterally exerted, and we would hope that it might be done on a multilateral basis. The good reasons I think are very clear, to the extent that coastal and anadromous fisheries are involved. The coastal state has both a responsibility and a burden of maintenance, management, knowledge, and facilities, which includes a burden of

maintaining environmental conditions that will permit the very existence of the stock to continue. I think this provides a basis quite apart from the historical, and if you like, power, basis that the coastal state is where the fish are and that is going to be recognized however one wishes to view it.

I would set forth then as the requirements for any workable scheme of sharing an international fishery, some highly practical, if you like, sets of this sort. First, whatever scheme you devise, protection must be provided for the basic productivity of the stocks involved. Without that it doesn't make much sense to talk about the allocation problem. It must also provide, as a corollary of that, that the methods taken to protect the productivity of the stocks must be flexible enough, must be responsive and sensitive enough, so that they can meet changes that simply cannot be foreseen accurately in natural conditions.

Any scheme, to be generally acceptable, must allow the participating nations a considerable amount of leeway to pursue their own mix of national goals without enforcing that decision on other participating nations. We are not all going to agree on how or at what level we will want the fishery to be prosecuted, but unless at least the major participants are able to meet the divergent objectives and pressures that they face, we are not going to get satisfactory general acceptance.

Whatever agreement we make on management and the allocation of the resulting available fish, we must provide both the opportunity and, if you like, the pressure to do the job efficiently. We are going to have to find some ways of getting away from the syndrome that we followed so often in the past, even in fisheries that have been managed successfully in a technical sense, of denying the benefits of better economic returns to both fishermen who participate and those who invest through piling excessive numbers of men and gear into the operation. That problem is no less real in the international than in the national sphere. There must equally be management and allocation schemes that encourage, rather than discourage, development of presently underutilized or unutilized species.

Again, our history of management is not very encouraging in that respect. As Dr. Pruter has mentioned, so often the technique of management is to rule out efficient gear and by so doing, to rule out the incentive to develop even more efficient gear and thereby make it that much harder to move on to additional species that we could very well use sometime in the future. There must be some reasonably fair method of dealing with the extremely difficult problem of new entrants to the game.

I will betray my own biases and offer the opinion that what we really face is an insoluble, but still inevitable problem. Is it more unfair to exclude a new entrant to a fishery that is already fully developed or to allow the new entrant to come in and impose the burden of adjustment on those who have developed the fishery and in many cases invested substantial

amounts in its management techniques? I will opt for the fact that it is less fair to plunge new entrants into a fishery already carrying as much as it can and that we must find some way of dealing with that.

There are obviously major exceptions with respect to the developing nations that I want to come back to in a moment.

Finally, I don't think we are going to make sense out of any international fishery sharing scheme under a management program unless we accept the hard fact that there can be no major uncompensated losers, even where an arrangement must be made, as I think it must in some cases, for exclusion of some present participants. A phasing of that withdrawal over a long enough period of time to prevent intolerable hardship on the people involved is an absolute minimum. I think we ought to recognize that where that kind of exclusion is necessary to make efficient use of the resource, there are other ways of compensating the losers than just carrying it on the back of the fishery alone. These need to be explored.

In the light of those standards, what can we say about the proposals that have been made? How well do they measure up to acceptable ways of facing up to the division or allocation problem? I think the refreshing note that emerges from the proposals that I have seen most recently is some retreat from the extreme positions on the part of almost all the important participants, but they still remain awfully far apart.

First, with regard to the exclusive economic zone concept, of reserving for coastal states, not only the right to manage, but the right to harvest from within a very extensive economic zone. I think there are some words of caution that need to be put out immediately--the obvious one is that in many of the major fishing nations, and the United States is certainly no exception, you may help some groups by such a major extension of an exclusive fishing zone, but you certainly are going to hurt some other groups. That impact is not limited incidentally to developing fishing nations. There are nations on the west coast of Africa which now have high seas fishing capacity who could be very severely damaged in their ability to exploit virtually untouched species off the coast of other nations if the exclusive fishing zone concept is pursued uncritically and without modification. It raises the question if it is really to the advantage of an underdeveloped coastal state to reserve all of the catch for its own nationals. I don't think world opinion will accept, and certainly practical world politics will not accept, a situation in which a nation excludes other fishing nations from exploitation of stocks which it cannot itself utilize economically, even though at some future date it may and perhaps should preserve the right to control those species, as and when it becomes capable of doing so. But to allow substantial amounts of totally wasted fish, because of inability to harvest what one has sought control over, is not going to wash in the international community.

Moreover, for many of the underdeveloped countries, the assumption of the responsibility for management of coastal zone type fish carries with it an assumption of capacity and financial ability to actually do the management job which many of them simply do not have and are not likely to have in the near future. There are a lot of alternatives to exclusive fishing by the coastal state that might seem to offer a lot more to such countries, particularly in the underdeveloped areas:

1) to allow distant water fishermen to harvest underutilized species, at least selectively,

2) to charge fees or license requirements for that privilege,

3) to require, as may seem very desirable in some cases, that the participating distant water nation undertake some of the obligation for training of fishermen of the developing country to participate ultimately in the resources off their own coast, and

4) in some cases to require that urgent local food requirements be met, at least in part, by requiring that some of the landings be in the country whose control is being dispersed in this fashion. In other words, control by the coastal state need not mean exclusive fishing.

A variety of flexible arrangements seem perfectly possible that would permit, on a world basis, the fullest possible utilization of marine fish without in any way impairing the long-term ability of the coastal state to assume the ability to harvest itself, as and when it acquires the capacity and the markets to do so. This leads me to the conclusion that the obvious drift toward some kind of coastal preference, in whatever the Law of the Sea Conference works out, not only is not incompatible with regional multinational agreements but will also require them in almost every instance if it is to be a sensible coastal preference arrangement. We will still have the question--what kind of international management units will we have and what kind of sharing arrangements will we seek under those international agreements? There are some things I think we don't want to do and at the risk of stepping on some toes, let me say that we have had enough experience now with fixed quotas for internationally shared fisheries that make no provision for allocation of that quota among the participating nations to know that that road leads to economic disaster. The experience with the halibut fishery and the developing experience in the tuna case indicate that as long as we continue to pour new units into a fishery that is already topped out in physical yield capability, we are simply throwing away the benefits that fishery science and management make available to us from the standpoint of the economic well-being of both those who participate in the fishery and those who buy its products. However you slice it, we are going to have to make some decisions about how an overall sustainable catch is to be divided so that each country has some reasonable assurance

that it doesn't have to get out and catch its fish before the hoarders get to them. We have seen the results of that type of action.

I think we have to face also the fact that there is no scientific or economic basis for any sharing or allocation agreement. We can learn all there is to know about the fisheries of the North Pacific or the tuna of the Southeast Pacific and it still provides no scientific answer, who should get what share of the resources. Nor can the economist do any better. I think the first step in real progress is to recognize that this is essentially a political or negotiable kind of question and start out from that premise. It is not the first nor will it be the last of that kind of question, but we will make a lot more progress if we recognize it.

It follows that some variant of a country quota system under the blanket of an overall catch quota or catch determination made on an international basis is likely to be a useful device in some, although not all, of our world regional fisheries. I can think of no other practical solution, for example, to the North Atlantic scramble that is now going on. It is a crude meat-axe way of approaching it, but it is considerably better than what we will get if we have no real control over fishing mortality and if the resulting allocation is unplanned as it is at the present time. Much the same could be said of the West African case.

Finally, it is obvious to me, I hope to you as well, that there is a need for recognition of a world program for dealing with the wide-ranging pelagics like the tuna. There is simply no way in which a regional approach to that problem will make sense without simply dumping the problem on the next region's lap, and we are rapidly running out of oceans in which to bury our problems. This is a world resource--the people exploiting it are world roving and nothing short of a world program is going to result in successful management and fair allocation of those catches.

I think I would summarize on something of a hopeful note, by putting it this way. There is no way that I as a social scientist or my friends in the fisheries science field can imagine a program in which everybody's ideal goal is going to be realized. Every international fishery management program and every way of sharing the fish is going to be a compromise. If we learn to live with that, we will have taken the first and most important step toward practical agreements. As a corollary, I think I would argue on a hopeful note: it is possible to demonstrate, even in some of the most acrimonious areas of dispute, that all of us will be better off with a management and sharing program that is not ideal for any one of us than if we allow the situation to degenerate into the chaos that now threatens a real world disaster in world fisheries.

FISHERIES USES OF THE SEA

Industry Interests

Harold Lokken
Manager
Fishing Vessel Owners Association
Seattle, Washington

Any discussion of the law of the sea at this point in time must necessarily be a complex one. It is a discussion in which anyone may participate no matter what his background or training. This follows from past experience which defines the forces which shape the rules and regulations governing orderly and peaceful use of the sea as not being limited to those involving law alone but including political, social, and economic considerations as well.

Another belief requiring clarification is that referring to the forthcoming Law of the Sea Conference in 1973 or 1974, the assumption being by this reference that the decisions affecting the law of the sea will be made at the plenary sessions of the conference which will take place in either of these years or later. Those who wait until the final plenary sessions of the conference, however, may find that they have missed the boat insofar as having any meaningful input into the decisions of the conference. There have been four preparatory sessions so far and more are scheduled. This leads one to suspect that by the time the final conference is held, all the important decisions will have been made and that all that will be left to decide is whether the majority vote will be yes or no, and there is a good possibility that even this may be accurately forecast.

At this juncture, it is impossible to be precise on the impact in this area of the Law of the Sea Conference, including all the preparatory sessions of the conference as well as the final plenary sessions themselves. This being the case, one must speculate as to the possible options facing the conference and estimate the impact of each on the Pacific Northwest.

Insofar as possible, I am going to limit my treatment to the impact on coastal fishermen in order not to encroach upon the subjects assigned to other speakers on this program. There are four segments of the U.S. fishing industry which have a vital interest in the outcome of the conference. The first involves oceanic species, such as tuna, which range far and wide in the oceans of the world. The second concerns anadromous species such as salmon which originate in the inland waters, then range out in offshore ocean waters during part of their life cycles before returning to inland waters to complete their life spans. The third consists of species such as shrimp which are taken not only in domestic waters by U.S. vessels but are taken by U.S. vessels in coastal waters off South America as well. The fourth segment on which I shall speak covers coastal species, such as halibut and other bottom fish. The first two segments will be covered by other speakers and while the third segment is also a coastal species, I shall discuss it only generally in connection with other options, as it is not a direct problem in the Pacific Northwest. The needs of this group, however, will have an influence on U.S. policy and therefore will have an indirect impact upon the Pacific Northwest particularly with reference to management of underutilized coastal species.

As for the options that are possible, I see at least seven that are available to the conference. Before discussing them, however, I would like to digress a bit to indicate the urgent need of action of some kind if our marine resources are to be preserved.

Fishing technology is advancing at such a rate that before long, for all practical purposes, no species of fish of any consequence in the ocean will be able to evade detection. The mobility of vessels, too, is such that no part of any ocean now is too far from any home base to be free from exploitation. It is necessary then for us to put our house in order if we are to avoid complete depletion of our marine resources not only by existing nations and fleets but also by those who can be expected to enter the field. We, therefore, do not have too much time left to develop a rational system of utilization of our marine resources if we have any concern for the future.

Let me spell out the necessary ingredients of such a system as I see them. The system must have as its overriding and primary concern the health of the stock of fish or species to be managed. Management must be tailored to each species involved. A shotgun approach to management is to be avoided. There must be continuous monitoring of each of the species to determine its size from year to year. Fishing pressure must then be regulated by means of seasons, quotas, gear restrictions, limited entry or any other appropriate means. The system will require a higher degree of sophistication in the field of stock assessment than that which now exists but with continued improvement in marine acoustics, this degree of sophistication is within the limits of attainment.

While the essential ingredient in such a system is the need to regulate fishing pressure to the size of the stock on which the fishing pressure is to be applied, the system, to be successful, also requires a high degree of cooperation from those who will be regulated. This cooperation can be attained only if those who are regulated are assured that the fruits of their sacrifices will accrue only to those who have made the sacrifices and not to new and belated entrants who have had no part in the rebuilding or maintenance process. Such a system, therefore, requires coastal control of coastal resources. Any other control would be doomed to failure.

Such a system need not mean complete control of unused or underutilized marine resources. The state of the food supply in the world is such that no food anywhere should be allowed to go to waste. For this reason, coastal control of coastal resources should be limited to the extent of the capability of the coastal country to harvest adequately the coastal resources. The harvesting country, however, should operate under restrictions agreed upon with the coastal country to prevent overfishing on the species fished and damage to other species found in the fishing area.

Implementation of such a system, in my opinion, should be the objective of coastal fishermen in the current and upcoming Law of the Sea negotiations. This can be done without harm to other segments of the U.S. fishing industry.

Returning to the options available to the conference, the first is to reach no agreement whatever. This includes also the possibility that a face-saving agreement which will satisfy the aspirations of no one will receive the necessary majority vote. I place both these possibilities in the same category.

In the event the conference fails in this way, the arena will shift from the site of the conference, wherever it may be, to the capitals of the world where governments, motivated possibly by regional groups with more or less identical interests, will extend their jurisdictions one by one. When a sufficient number have extended their jurisdictions, their extensions will become recognized as the equivalent of international law. One need only go back to the 1960 Law of the Sea Conference when a 12-mile fishery zone failed at the conference but became a reality for all intents and purposes in the sixties when most governments declared the extension unilaterally.

Should the conference fail, I can see the United States joining with other countries as it did with the extension to 12 miles except that the United States can be expected to include in its extension adequate limitations to provide for proper utilization and conservation of oceanic, anadromous and underutilized coastal species. When this occurs, the impact in the Pacific Northwest for coastal species will be beneficial although achieving this objective through conference action would be much more desirable. The beneficial effect is also based upon the assumption that coastal species will not be depleted by this time beyond the point where they can be rebuilt. This

will require sacrifices on the part of domestic fishermen and a complete reorientation of thinking about management of marine resources generally. This reorientation will have a better chance of success after coastal countries secure jurisdiction over coastal stocks, as coastal fishermen will then have an incentive to build for the future. Without this jurisdiction there will be no support for any system of utilization except that which involves fishing for everything in sight before the other fishermen have a chance to participate.

Therefore, coastal state jurisdiction over coastal fishery resources will mean a better opportunity to arrest the current decline of our Northeast Pacific coastal fishery resources. It will mean also a chance to arrest rising prices for fish to the consumer caused by diminishing supplies. It will mean that supplies of these coastal species will be available and enjoyed by consumers in the future as well as at the present time. It will mean further improved conditions in the fishery economy of this area. But most of all it will give us an opportunity to tackle the job of placing the fishing industry on a sound, stable basis wherein fishing can be adjusted to the ability of the resource to maintain itself.

The second option of the conference, and one which is not too likely to be exercized in my opinion, is that of limiting coastal fishery jurisdiction to a narrow coastal band such as 12 miles, or even a greater distance, but not to a sufficient distance to include all the coastal stocks of fish into one management regime. The effect of such an eventuality would be to perpetuate the status quo with a continuing depletion to a level far below optimum productivity. It would also trigger a rash of unilateral extensions by countries opposed to narrow jurisdiction who had not already extended their jurisdictions unilaterally. The process by governments of ratifying the conference's action would be prolonged indefinitely, perhaps to the point of completely nullifying the work of the conference by reason of the failure of a sufficient number of fishing countries to ratify.

The third option is that of extended coastal jurisdiction on coastal and anadromous species with multinational control on far-ranging migratory or oceanic species such as tuna. The jurisdiction here would not be expressed in the distance but would cover the range of the species involved. This is the present U.S. position. It satisfies the needs of coastal fishermen except that the interim measures are needed to prevent further depletion of these species pending the reaching of a final agreement by the conference and pending the receipt of a sufficient number of ratifications by fishing nations to put the agreement into effect. Implementation of this option would permit the development of a rational system of resource utilization as outlined previously.

The fourth option of the conference is that of extended jurisdiction based upon a zonal approach or an extension of jurisdiction to a stated distance. Assuming the distance to be 200 miles as advocated by a number of Latin American countries, the approach would be satisfactory to fishermen in the Pacific Northwest interested in coastal species, but it would be unsatisfactory to fishermen interested in salmon. I shall not elaborate upon this further as it will be discussed by another speaker.

The fifth option of the conference is that involving a combination of the species and zonal approaches. It might be a species approach in some areas with zonal approach in others. Or it might be a zonal approach for coastal species with a species approach for anadromous and oceanic species. Again if coastal species are controlled by coastal countries, our coastal fishermen would receive the protection they seek. There have been suggestions, however, that extensions of jurisdiction be given only to developing nations. In effect, this would maintain the status quo for fishing in the Pacific Northwest and would be a development that is intolerable to Northwest coastal fishermen.

The sixth option is one that is likely to occur: a postponement of the final plenary sessions of the conference for a period of time beyond 1974 in an attempt by certain members of the conference to develop sufficient support for some proposal which at the scheduled end of the conference lacks a sufficient majority. Support for such a delay could come from two opposing forces. One would be the countries who oppose a general extension of jurisdiction. The other would be those who have already unilaterally extended their jurisdictions and therefore oppose any general extensions less than that which they now have. The combination could be formidable. Such a consequence would also trigger additional unilateral extensions by many countries who have held back awaiting a favorable outcome of the conference.

A postponement of the final conference would have an immediate harmful effect on our coastal fishermen in that it would permit a continuation of the current decline in our coastal fisheries. Eventually our coastal fishermen would benefit whenever a sufficient number of extensions had taken place to give the extensions a reasonable semblance of being international law accompanied by recognition of a reasonable number of the fishing countries of the world. This benefit to coastal fishermen would occur only if the jurisdiction came before our coastal resources were depleted beyond the point of no return.

A seventh option of the conference is to set up a multinational control of marine resources presumably including a system of allocating resources among the possible participants. If this option were to occur, it would no doubt take place on a regional basis. It would in a sense be an expansion in the North Pacific of the International North Pacific Fisheries Commission to include all the countries desiring to participate in the fisheries of the North Pacific. It would, as I see it, be the same structure as that now in existence in the Atlantic otherwise known as the International Commission for North Atlantic Fisheries or ICNAF for short.

A brief examination of both of these organizations will indicate why people in the producing end of the fishing industry do not regard them very highly. In the North Pacific, the North Pacific Commission began in the middle fifties with the consideration of problems involving salmon, halibut and herring. It has not been able to resolve the problem of salmon west of 175° West Longitude. It has not been able to prevent the almost total depletion of halibut in the Bering Sea, the area of its primary interest. During the life of this commission, the annual halibut catch has dropped from an average of 65 million pounds to 40 million pounds during 1972. While the halibut resource is

under the control of the Halibut Commission, competing fisheries are within the province of the North Pacific Commission giving the latter commission some measure of responsibility for depletion in the halibut fishery. Herring also has largely disappeared as an item of interest to the North Pacific Commission. Thus the commission seems to be dropping responsibilities for resource problems rather than assuming them as was originally intended.

In the Atlantic the situation is even worse. The regard in which the Atlantic Commission is held is so low that the U.S. Section's Advisory Committee recently voted to recommend withdrawal of the United States from the Commission. Supporters of the commission point to the fact that country quotas were recently approved by the commission, but time has yet to prove that these quotas are low enough to bring about any material recovery in the health of the western Atlantic species of fish upon which U.S. fishermen depend for their livelihoods. Time also will tell whether ICNAF members will vote lower quotas, should those about to go into effect prove to be too large.

The multinational control approach to the management of marine fisheries is more often than not used to preserve the status quo. Those who seek progress in this mechanism find little but frustration. Coastal fishermen see little future in such management systems as they apply to coastal species. This, however, does not mean that multinational control should not be used to manage a species which migrates within the offshore jurisdictions of two or more countries. Coastal fishermen see the need for such control but want no absentee or distant jurisdiction.

It is for these reasons that I believe the impact of the Law of the Sea Conference will be a beneficial one for the Pacific Northwest only if coastal countries are given jurisdiction over coastal species to the limit of their habitats. Anything less than this will hasten the day when our offshore coastal fisheries will no longer be a material resource to the United States in general and the Pacific Northwest in particular.

FISHERIES USES OF THE SEA

Industry Interests

August Felando
General Manager
American Tunaboat Association
San Diego, California

U.S. Tuna Industry: Some Economic Factors to be Considered

There are a variety of statistical measures to indicate the importance of the tuna industry in the fisheries of the United States. In 1971, 63.5 percent of all canned fishery products for human consumption in terms of wholesale value was canned tuna. Last year, canned tuna represented 21.4 percent of the per capita consumption of all commercially caught fish and shellfish in the United States.

With respect to the annual volume of catch and value of such catch to the fishermen, tuna was second to menhaden in volume for 1971 and second to shrimp in value. As to fleet size in terms of vessels that are of 200 gross tons or more, the tuna fleet represents 49.3 percent of all vessels in the U.S. fishing fleet in this tonnage classification for the period 1968-1971. Statistics on the replacement value of various types of fishing fleets of the United States are not available, but some estimates have been published as to the U.S. tuna fleet. For the period 1957 to October 1972, capital investment for new construction and modifications to existing hulls was conservatively placed at about $204 million.

The canned tuna industry of the United States will celebrate its 70th anniversary in 1973. Ever since tuna was first canned in California, the United States has been the world's number one market for canned tuna. In addition to food for humans, tuna has been the basis for the most important single by-product development in the fishing industry: canned fish products for animal food. In 1948, the total value of such products was about $7 million; in 1971, the wholesale value exceeded $104 million, of which about 78 percent could be attributed to production from tuna plants.

In examining statistical measures concerning dollar values for fisheries, it is the practice to fix annual dollar amounts at levels for fishermen, processors, and retailers. In the tuna industry, the values fixed for 1971 were as follows: ex-vessel value of frozen and fresh tuna to the fishermen at about $95 million, processor value for canned tuna and tuna-like fish and by-products at about $500 million, and retail value for processed products, human and animal, of over $800 million.

Prior to 1948, practically all tuna-processing plants were located on the Pacific Coast. In 1972, the 26 plants processing tuna were located in California, Oregon, Washington, Hawaii, American Samoa, Maryland, and Puerto Rico.

In describing the U.S. tuna fleet, tuna vessels are generally classified according to fishing gear and size in terms of frozen tuna carrying capacity. It is customary to limit consideration of the tuna fleet to vessels of 100 tons of frozen tuna carrying capacity and over. In doing this, the description becomes less complicated because fewer vessels are involved. Nevertheless, such a description would not adequately indicate the geographical distribution of vessels engaged in tuna production. A very small fleet of vessels operates seasonally on a skipjack tuna fishery off Hawaii. On the East Coast of the United States fewer than five small seiners, operating from New Bedford, fish for bluefin and skipjack tunas during the summer. The vast majority of small tuna vessels of less than 100 tons carrying capacity are located in ports in California, Oregon, and Washington. These are jig boats (trollers) and small pole and line vessels (baitboats) that fish seasonally on the albacore fishery that migrates from unknown regions in the Central Pacific to the Pacific coast from Baja California to Canada. In addition, there are some small seiners that customarily fish for mackerel and anchovy, for the bluefin tuna that follow the albacore and for bonito that are available off southern California for about 5 months during the year. The vessels that engage in these seasonal tuna and tunalike fisheries number in the hundreds.

Taking into account the entire catch of these hundreds of small seasonal-type tuna vessels located in Hawaii, Pacific Coast states and New Bedford, the total annual catch would not exceed an average of 35,000 short tons or about 1/7th of the total annual production of the U.S. tuna fleet composed of vessels of 100 or more capacity tons.

The Inter-American Tropical Tuna Commission (IATTC), which monitors the fleets of all nations fishing for tuna in the eastern Tropical Pacific, established the total number of vessels operating in the area for 1971 as 280, with a carrying capacity of 94,198 tons. The IATTC does not include trollers or longliners in such tabulation.

Difficulties are encountered in attempting to compare the number and capacity of the U.S. tuna fleet with tuna fleets of other major tuna-producing countries such as Japan, Korea, Taiwan, Spain, and France. In recent years, the tuna fleet of Japan has numbered from 2,600 to 3,000 vessels of about 300,000 gross

tons. According to a study made by Dr. Jim Joseph, director of investigations, IATTC, the international tuna fleet had a total capacity of about 700,000 metric tons in 1970. For that same year, the world's tuna catch of yellowfin, skipjack, albacore, bigeye, and bluefin tuna was about 1,106,000 tons. Japan and the United States accounted for 65 percent of the world catch of these six major species. According to Dr. Joseph, Japan's catch was 481,600 metric tons or 44.6 percent of the world catch, while the United States produced 225,300 metric tons or 20.8 percent of the world catch. These statistics indicate the high production characteristics of the tuna fleet compared with the thousands of vessels in the Japanese tuna fleet.

An interesting trend has been established in the vessel size composition of the U.S. tuna fleet that does not follow the pattern established for other vessels in the U.S. fishing fleet. As to purse seiners, vessels of less than 400 tons capacity are in sharp decline in number and aggregate capacity, while vessels of 400 tons and greater capacity show continued growth. In addition, the size of super seiners seems to be concentrated in the 1,001-1,500-ton capacity range. With respect to baitboats, the trend is directly opposite; the vessels are concentrating in the smaller capacity range, namely, less than 100 tons capacity.

On the basis of share of catch with regard to all tunas except albacore, the purse seine gear is the dominant fishing technique used by the U.S. tuna fleet. At present, only tuna purse seiners operate in the Atlantic, and, except for seasonal excursions of four baitboats, the balance of the baitboats and trollers in the U.S. fleet fishes north of 15° North Latitude on the eastern Pacific. It is for these reasons that a discussion about the operation of the U.S. tuna fleet must revolve about the activities and characteristics of the U.S. tuna purse seine fleet.

On the basis of vessel size composition, the U.S. tropical tuna fleet does not follow the pattern established in the U.S. fishing fleet. Table I shows that the U.S. tuna fleet, composed primarily of vessels of 200 gross tons or greater, represents 49.3 percent of the 286 vessels that are of 200 gross tons and over in the recorded 15,894 vessels in the U.S. fleet for the period 1968-71.

Tables II and V reflect statistics regarding the number and capacity characteristics of the U.S. tuna fleet operating primarily in the eastern Pacific and in the regulatory area established by the IATTC. Table VI provides a historical review of construction activity in the tuna fleet.

A general characteristic that prevails in an analysis of the production of tuna by the U.S. fleet is that of high productivity per man, per vessel. It is not "labor intensive" but rather it can be accurately described as "capital intensive." The reverse may be reached in an examination of the production of the tuna processors, although this segment is recognized as highly efficient and competitive. Fewer than 2,000 fishermen provided about 40 percent of the light meat production needs of the American market for 1971.

TABLE I. NUMBER OF U.S. FISHING VESSELS, 200 GROSS TONS AND OVER, AND OF TUNA VESSELS ONLY, 1968-71

Year	Entire U.S. fishing fleet	U.S. tuna fleet
1968	226	110
1969*	20	12
1970*	15	7
1971*	25	12
TOTAL	286	141

*Additions only. Removal of vessels caused by sinkings or for other reasons not recorded.

Source U.S. Department of Commerce (NOAA-NMFS) Fishery Statistics of the United States, Statistical Digest 62; Current Fishery Statistics No. 5900, Fisheries of the United States, 1971; Current Fishery Statistics No. 5600, Fisheries of the United States, 1970.

TABLE II. ALL U.S. FLAG BAITBOATS AND SEINERS OPERATING IN IATTC AREA, 1962-1971

Year	Baitboats Number of vessels	Baitboat capacity	Seiners Number of vessels	Seiner capacity	TOTAL Vessels	TOTAL Capacity
1962	40	5,885	115	30,636	155	36,521
1963	59	3,825	119	36,504	178	40,329
1964	36	3,267	118	37,249	154	40,516
1965	44	3,980	118	38,059	162	42,039
1966	51	4,794	108	35,945	159	40,739
1967	47	4,419	106	36,932	153	41,351
1968	50	4,644	109	41,338	159	45,982
1969	43	4,077	120	49,093	163	53,170
1970	44	3,827	121	56,179	165	60,006
1971	48	3,770	124	69,790	172	73,560

Source IATTC unpublished, 9-14-72

TABLE III. U.S. SEINERS (SHORT TON CARRYING CAPACITY)

Year	SEINERS Capacity less than 401 short tons		SEINERS Capacity greater than 400 short tons	
	Number	Aggregate* capacity	Number	Aggregate* capacity
1967	85	21,790	23	15,175
1968	77	19,722	30	20,195
1969	74	18,808	46	30,285
1970	62	16,100	57	39,530
1971	50	12,442	70	55,490

*Frozen tuna carrying capacity in short tons

Source NMFS

TABLE IV: U.S. BAITBOATS (SHORT TON CARRYING CAPACITY)

Capacity group	Number of vessels	Aggregate capacity
0-50	21	798
51-100	19	1,490
101-150	6	799
151-200	4	640
201-250	4	920
251 & up	1*	360
TOTAL	55	5,007

*This baitboat presently operating in Western and Central Pacific.

Source NMFS

TABLE V. U.S. PURSE SEINERS OPERATING IN IATTC AREA (SHORT TON CARRYING CAPACITY)

Capacity group	Number of vessels	Aggregate capacity
0-150	3	385
151-200	17	3,142
201-250	8	1,845
251-300	10	2,756
301-350	6	2,021
351-400	9	3,361
401-500	12	5,910
501-600	10	6,500
701-800	9	7,027
801-900	6	5,250
901-1,000	14	13,650
1001-1500	17	20,700
1501 & up	2	3,625
TOTAL	123	76,172

Source NMFS

TABLE VI. REVIEW OF NEW CONSTRUCTION AND CONVERSION IN U.S. PURSE SEINE FLEET, 1957-1972

Year	Total vessels	Total capacity	New construction No.	New construction Capacity	Military hull conversions No.	Military hull conversions Capacity	Baitboat hull conversions No.	Baitboat hull conversions Capacity	Estimated cost Million $
1972	28	29,000	27	28,050	1	950	-	-	87.0
1971	13	15,150	13	15,150	-	-	-	-	37.8
1970	11	9,200	11	9,200	-	-	-	-	20.5
1969	13	8,084	10	6,224	2	1,560	1	300	18.7
1968	4	3,200	4	3,200	-	-	-	-	6.9
1967	3	2,450	3	2,450	-	-	-	-	4.1
1966	1	550	1	550	-	-	-	-	1.0
1965	2	690	1	550	-	-	1	140	1.0
1964	1	779	1	779	-	-	-	-	1.2
1963	7	5,443	1	779	4	3,959	2	705	5.5
1962	11	4,468	1	779	2	1,042	8	2,647	3.9
1961	21	7,808	1	460	2	1,414	18	5,934	4.8
1960	52	15,264	-	-	-	-	52	15,264	7.8
1959	14	4,319	1	340	-	-	13	3,979	2.4
1958	3	927	2	680	-	-	1	247	1.1
1957	4	1,272	3	1,020	-	-	1	252	0.1
	188	108,604	80	70,211	11	8,925	97	29,468	$ 203.8

Special Note: Prior to 1957, no baitboats were converted to purse seiners. The purse seine technique was used extensively on tuna by a large group of vessels from San Pedro. In the industry, this group has been called regular purse seiners. Until the early 1950's, the fleet fished seasonally on tuna, with more emphasis by the fleet on the sardine and mackerel fisheries.

*Preliminary: Twelve vessels have commenced voyages and five vessels have been launched as of October 1, 1972. Eleven vessels are under construction.

Source American Tunaboat Association, One Tuna Lane, San Diego, California, 92101.

TABLE VII. IATTC EASTERN PACIFIC YELLOWFIN TUNA REGULATORY PROGRAM 1966-1972

Regulation Year	Closure Date	IATTC Quota (short tons)	Actual Annual Catch (short tons)	International Fleet Capacity (short tons)
1966	15 Sept.	79,300	90,800	46,700
1967	24 June	84,500	90,350	46,445
1968	18 June	106,000	113,000	57,126
1969	15 April	120,000	126,500	62,347
1970	22 March	120,000	142,700	72,936
1971	8 April	140,000	114,200	95,477
1972	5 March	140,000	139,602[1]	99,887[2]

[1]Estimated catch as of October 2, 1972 - IATTC
[2]Estimated as of January-February 1972 - IATTC

WORLD TUNA RESOURCES: SOME FACTS ON BIOLOGY AND DISTRIBUTION

More than a dozen tuna species are caught throughout the major temperate and tropical oceans of the world. In terms of value the six most important species are yellowfin, skipjack, albacore, bigeye, northern bluefin, and southern bluefin.

Tunas are characteristically fishes of similar habits and appearance but vary widely in size. Skipjack rarely exceed 25 pounds in weight and few albacore captured are greater than 60 to 70 pounds. The other four species reach much greater weight. Yellowfin and bigeye may reach as high as 300 pounds and bluefin frequently are even heavier.

Tunas live in the warm upper layer of the oceans primarily between 35° N and 30° S. They spend their entire life on the high seas. They are highly migratory and extremely fast swimmers. Breeding and nursery grounds of the tunas cover vast areas of the oceans.

The distribution and migration of the economically important tunas are related to changing features of the oceanic environment. Three of the six important species, yellowfin, skipjack, and bigeye, are tropical in occurrence and are only found in quantities where water is 68 F or warmer, although skipjack sometimes appear in somewhat cooler water.

Yellowfin and bigeye do not appear to be as highly migratory as the transoceanic skipjack. In the Pacific, skipjack move between the coastal waters of the eastern Pacific and the central Pacific. Each of the tropical species is distributed continuously throughout the Pacific, Atlantic, and Indian Oceans and is available commercially the year around.

Albacore and bluefin, the temperate species, are summer and autumn residents to the north or south of the warm 68 F isotherm in the earlier years of their life. Both albacore and bluefin of older age groups are caught the year around in tropical waters of the western and central Pacific, the Indian Ocean, and the south Atlantic. There is evidence the spawning occurs in these regions.

In the Pacific, the northern bluefin and albacore migrate between the coasts of North America and Asia. In the Atlantic, bluefin travel between the Bay of Biscay, the Mediterranean and the waters of the Gulf Stream off North America. The southern bluefin tuna, found only in the southern hemisphere, migrate from spawning areas around Australia to the Atlantic, Pacific, and Indian Oceans.

Within the limits of their temperature range, distribution of tunas varies markedly from month to month and from year to year. Changing oceanic conditions appear to be a primary cause. Food for tunas usually is found in regions of high biological productivity. When nutrient-rich deep waters

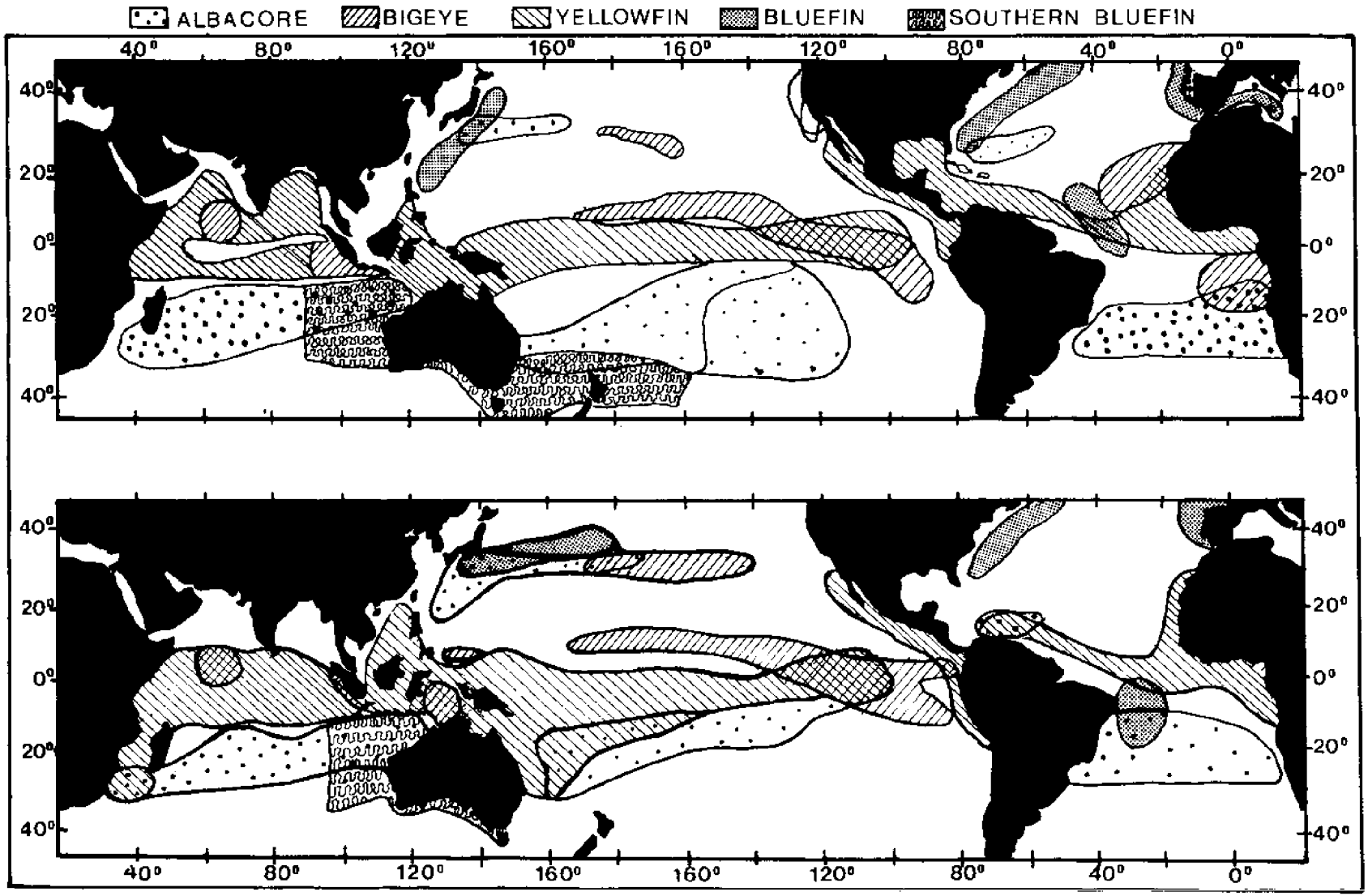


Figure 1. Worldwide distribution of tunas. Top, northern summer; bottom, northern winter (after Nakamura, 1965).

are moved into the layer of light penetration by oceanic circulation, production of phytoplankton is stimulated. In turn, large crops of forage organisms are made available and the concentration of tunas increases. Figure 1 illustrates distribution on the basis of catch, but these charts do not reflect recently discovered areas.

TUNA RESOURCES: MANAGEMENT AND CONSERVATION IN EASTERN PACIFIC

Research on the yellowfin and skipjack fishery in the eastern Pacific was initiated in 1950 through an international convention between the governments of Costa Rica and the United States. At that time a body known as the Inter-American Tropical Tuna Commission (IATTC) was established. Other governments fishing for tunas in the eastern Pacific Ocean are eligible for admission to the commission, and under this provision Canada, Mexico, Panama, and Japan have joined. Ecuador joined in 1961 but denounced the treaty effective August 1968. Nicaragua and France have indicated interest in making application for membership.

The commission's scientific staff collects and interprets data to facilitate the maintenance of tuna populations at levels that will permit maximum sustained catches. Investigations into their life history, population structure, and ecology with a view as to the effects of environmental factors and fishing effort are the commission's primary objectives. When scientific findings indicate conservation steps are necessary, the commission recommends such measures at an intergovernmental meeting where regulations are proposed and adopted.

In the early 1960's it was determined by IATTC that the eastern Pacific yellowfin stocks could support an annual yield of around 95,000 tons. The efficient purse seiners were able to exceed this amount considerably, and in 1966 the member countries of IATTC agreed to regulate the yellowfin fishery under a quota system. That year's quota was set at 79,300 tons in order to rebuild stocks to their optimum levels. In 1967 the quota was 84,500 tons and in 1968 it was 106,000 tons because favorable environmental conditions had caused a temporary increase in the equilibrium yield--that is, the amount that can be removed without altering the stock size. In 1969 and 1970, however, the quota was raised to 120,000 tons and in 1971 and 1972 to 140,000 tons. The quota was set above the estimated equilibrium yield as a check on the estimated level and to provide research data concerning the effects of overfishing the yellowfin resource (*See* Table VII).

That part of the eastern tropical Pacific Ocean subject to yellowfin quotas and regulations occupies a surface area of over 5 million square miles, an area almost twice the size of continental United States. Figure 2 is a map of the yellowfin tuna regulatory area.

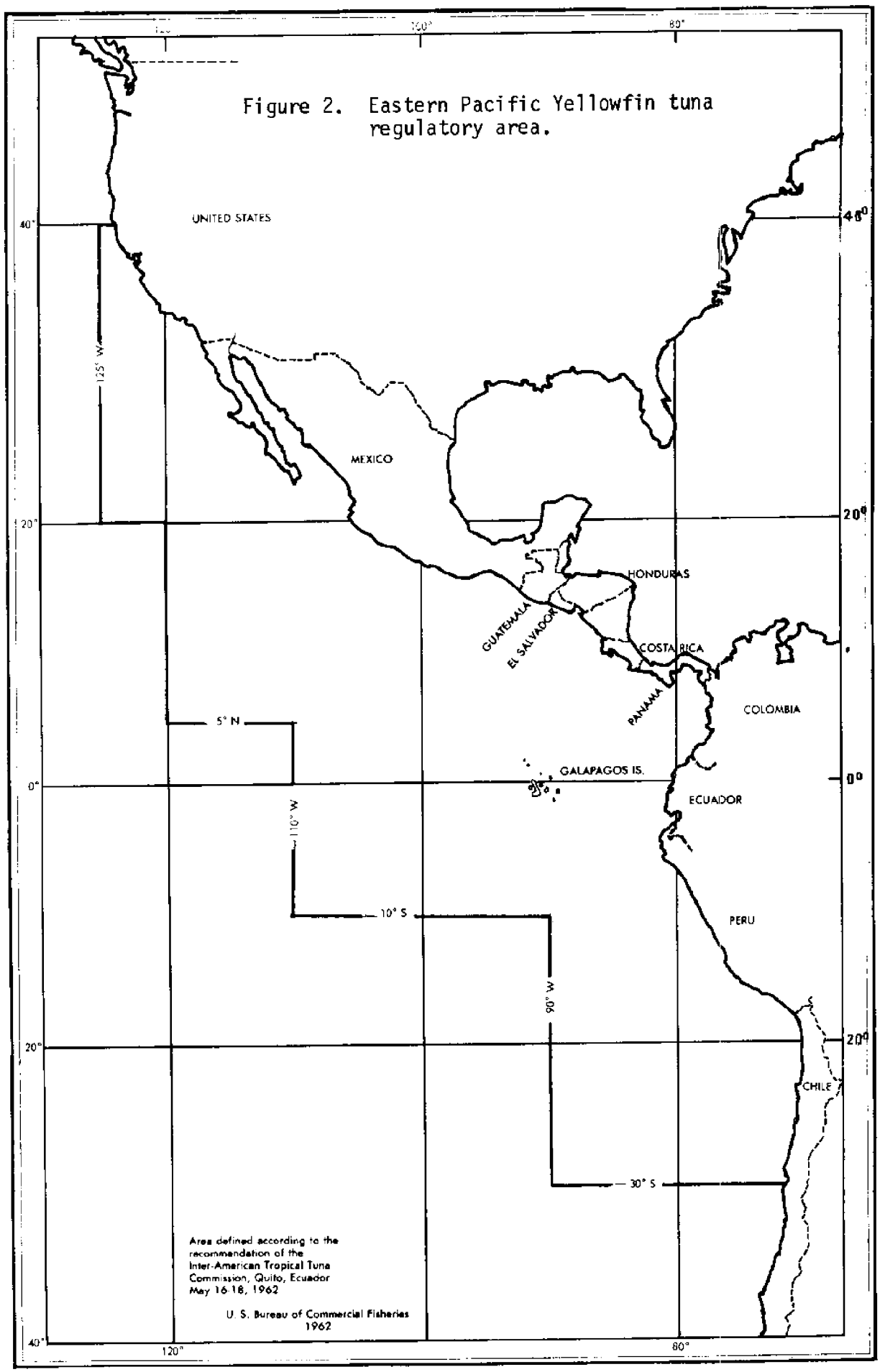


Figure 2. Eastern Pacific Yellowfin tuna regulatory area.

During the 7 years that the fishery has been under regulation, the yellowfin closure date has come earlier and earlier each year. This characteristic of a shorter open season and a longer closed season became clearly identifiable in 1967 and 1968. In 1966, the closure date was September 15; in 1967, it was June 24; and in 1968, the closure date was June 18. Mexico and the United States began to experience difficulties in the enforcement of the regulations concerning incidental catch limitations in 1967 and 1968.

A common problem confronted by the surface fleets of Mexico and the United States became recognized. The baitboats of both fleets were being affected by the development of a closed season that approximated the season when the yellowfin tuna, the regulated species, are more available to the baitboat gear. Thus, the argument in the United States was that the regulatory system favored the purse seine gear and discriminated against the baitboat gear. Mexico further argued that such a system would prevent the development of their fishing fleet because "the fish would be caught before its fleet could sail." Both these arguments were expressed in the proposal that the regulatory system was unfair and discriminatory toward small vessels. Costa Rica, with only one small baitboat in its fleet, also expressed dissatisfaction with the system. Experience under the system revealed that as the length of the open season decreased, the opportunity of the one cannery in Costa Rica to receive fish from United States vessels throughout the calendar year also was affected. Costa Rica started to express the view that the system was unfair because it caused the catch of yellowfin tuna to be generated early in the fishing year and not throughout the entire year and that such a condition would not allow a cannery operation that was dependent upon foreign supplied fish to operate profitably throughout the year. Japan expressed no concerns about the system during these years because the incidental catch limitation regulation allowed its longline gear to operate with little or no restriction. Ecuador, with a fleet composed of vessels operating on a daily basis, was not confronted with any difficulties by virtue of the special treatment of such vessels under the incidental catch allowance established by the commission.

As these problems were identified, the member countries responded by establishing special study committees pursuant to directions by the Inter-Governments. Alternative regulatory systems were proposed and studied by these committees. Mexico was particularly insistent in expressing the view the regulatory system should be replaced by a country quota arrangement, while the United States responded in approaches that considered various modifications of the existing system. With each annual meeting, a new effort to evaluate the regulatory system was initiated. It is fair to say that the United States carried the leadership in establishing and conducting these studies. Concern about the fairness of the system was particularly acute in the baitboat segment of the U.S. fleet. Necessarily, the position of Mexico and Costa Rica in helping the "small boats" was strongly supported by elements of the U.S. tuna industry.

Besides these attacks on the regulatory system, arguments were being advanced that the fishing effort and catch statistics for 1967 and 1968 suggested that the scientific staff of the commission had been too conservative in estimating the maximum sustainable yield (MSY). During the annual meeting of 1968, the director of investigations of the commission was directed to devise an experimental program to achieve greater certainty of the commission's understanding of the MSY of the yellowfin fishery. With the adoption of a 3-year experimental program during the 1969 annual meeting of the commission, a proposal by Mexico to establish a special allocation for small vessels was also adopted for 1 year only. The objective of such special allocation at such time was as follows:

(a) The United States concluded that such special allocation was necessary because the "small vessels" of all countries, regardless of gear, needed assistance to adjust to the lengthening closed season that would necessarily follow from the conduct of the experimental program; that the best form of assistance was in allowing such vessels adequate yellowfin tonnage to justify effort for the unregulated fish within the regulatory area during the closed season; that no special allocation was necessary for the larger vessels to operate during the closed season, because they were capable of adjusting by fishing outside the regulatory area or by fishing on unregulated fish located in areas where competition from the "small vessels" was seldom, if ever, confronted.

(b) Mexico concluded that such special allocation was necessary, because its fleet, which was small in number and size, required freedom from regulation to develop and to compete with other fishing countries. Mexico further added the argument that its cannery operation needed fish throughout the year for survival and growth.

As a result of the action taken in 1969 to adopt modifications of the regulatory system for 1 year only of the experimental program, only the U.S. fleet and part of the Canadian fleet were subject to the burdens of the regulatory system.

In 1970, the special allocation was again increased, and vessels participating in such relief were recognized to include vessels of under 401 short ton capacity rather than just the 1969 vessel size limit of under 301-short ton capacity. Significantly, the increases in the special allocation from 4,000 to 6,000 tons was granted during an intergovernmental meeting that was held 1 month after the closure date of the fishery. Thus, the catch in 1970 exceeded the experimental quota of 120,000 tons for 1970 by 15 percent or 21,000 tons. The intergovernment resolution termed the grant of the 1-year only request of Mexico as "emergency" in nature. Costa Rica received special relief in the form of a special proviso that allowed the country exemption of 1,000 tons to include landings by all flag vessels in such exempt country, provided that a tuna cannery was located in such country.

For 1970 and 1971, the IATTC continued the annual catch limit (quota) on the total catch of yellowfin tuna, subject to the right of the director of investigation to reduce or increase the limit. The increase was limited to no more than two successive increments of 10,000 tons each. The regulatory program continued the special allowances as follows:

(1) Exemptions to countries whose fisheries are not of significance, namely those whose annual capture does not exceed 1,000 tons. Allowing all members and cooperating countries to permit their vessels to land yellowfin tuna without restriction in such exemption countries that have tuna canning facilities until the 1,000-ton limitation is reached.

(2) Permission to vessels to land an incidental catch of yellowfin, the amount of such catch by each vessel to be determined by the flag country, provided, however, that the aggregate of yellowfin tuna taken by all such vessels of a country so permitted not exceed 15 percent of the combined total catch taken by such vessels during the period that vessels are permitted to land incidental catches of yellowfin tuna.

(3) Permission to flag vessels of each country, of 400 short tons capacity and less, that fish in the regulatory area after the yellowfin closure date to fish freely until 6,000 short tons of yellowfin tuna are taken by such vessels.

As a result of a special request by Mexico in 1971 and 1972, the IATTC also adopted a special allocation for "newly constructed flag vessels of those members of the Commission which are developing countries and whose fisheries are in the early stage of development, (that is, whose tuna catch in the Convention Area in 1970 did not exceed 12,000 short tons, and whose total fish catch in 1969 did not exceed 400,000 metric tons) and which enter the fishery for yellowfin tuna in the Convention Area for the first time either during the closed season in 1971 or during 1972, and, which, because of characteristics such as size, gear or fishing techniques, present special problems to fish unrestricted for yellowfin tuna until such vessels have taken in the aggregate 2,000 short tons of yellowfin." Only Mexico was able to take advantage of this special allocation in 1971 and 1972.

TUNA RESOURCES: MANAGEMENT AND CONSERVATION IN THE ATLANTIC OCEAN

The International Commission for the Conservation of Atlantic Tunas (ICCAT) was set up under a convention signed at a conference of plenipotentiaries on the conservation of Atlantic tunas in Rio de Janeiro in May 1966, and came into force on 21 March 1969. There are 12 member countries in the organization, which has its headquarters in Madrid, Spain. At present, no regulatory action has been undertaken. At the last meeting of the commission, steps were taken to examine regulatory proposals at meetings to be held in 1972. Proposals to establish minimum landing sizes for yellowfin and bluefin tunas and a total annual quota for yellowfin tuna have been submitted.

The structure of this international organization is quite different from the IATTC. There exists a commission, council, and panels. The council is established within the commission as an interim governing body. Four panels have been set up according to geographic (climatic) areas so the main species taken in principal fisheries can be considered together. These panels have the authority to formulate, on the basis of scientific investigations, recommendations for joint regulatory actions by the contracting parties. These panels also have responsibility for suggesting studies and investigations as well as collecting information relating to species within their particular review.

The member countries involved are as follows: Brazil, Canada, France, Ghana, Japan, Morocco, Portugal, South Africa, Spain, United States, Korea, Senegal.

TUNA RESOURCES: MANAGEMENT AND CONSERVATION IN OTHER OCEAN AREAS

Within the report of the seventh session of the Committee on Fisheries, held in Rome, April 6-13, 1972, the suggestion for a worldwide tuna management body was considered. The committee decided that although the "management of tuna in different oceans had many elements in common, including possible interactions between events in different regions, there was no need, at least at present, for establishing a single body responsible for the management of tuna in all parts of the world."

The committee felt that emphasis at present should be given to improving and strengthening the coordination and cooperation that already existed between the various regional bodies concerned with management of tuna.

The Indian Ocean Fishery Commission and the Indo-Pacific Fisheries Commission are two additional regional bodies that have the tunas of those waters under study. They may evolve to establish management controls on the harvesting of tuna as has the Inter-American Tropical Tuna Commission.

200-MILE FISHING ZONES: HARMFUL IMPACT ON THE U.S. TUNA INDUSTRY AND ON EXISTING AND FUTURE MANAGEMENT AND CONSERVATION PROGRAMS

The first consequence of a law of the sea regime that established the right of each and every coastal nation to own or regulate tunas within an extended fishery zone of 200 miles would be the destruction of the Inter-American Tropical Tuna Commission (IATTC) and the International Commission for the Conservation of the Atlantic Tunas (ICCAT). Since 1950, the United States has contributed over $6.5 million to the IATTC to finance the investigations conducted by the scientific staff of the commission. Amounts expended for tuna research activities in the Atlantic by the United States are also substantial. Under ICCAT, each country is responsible for developing and contributing scientific information for consideration by the ICCAT or its subsidiary organs. Therefore, the investment of the United States in these two international organizations in the years past would be lost, should these organizations be destroyed or de facto made ineffective by the adoption of the 200-mile fishing zone regime.

More important, the 200-mile fishing zone regime would make impossible any rational and effective program for the management and conservation of the highly migratory tunas within such zones. Obviously, the existence of a tuna management and conservation program would be subject to the decision of each and every coastal nation. The decision would have a tremendous impact on whether the objective of a conservation program would be attained, because of the facts concerning the biology and ocean distribution of the tunas.

In the eastern Pacific, the tunas are found off the coasts of 13 countries, and a substantial percentage of the catch is caught within 200 miles of most, if not all, such countries. Thus, a diversity of national approaches toward the conservation of tunas would have serious consequences on whether the objective of maintaining the tunas at or about their maximum yield on an annual basis could be attained. Studies have been conducted on the impact of 200-mile exclusive fishing zones. Fortunately, relevant and reliable data are available from the IATTC for purposes of this examination. The conclusion made by this paper--namely, that 200-mile fishing zones would be destructive and seriously imperil the U.S. tuna industry--is largely based upon the facts produced by the IATTC and upon studies analyzing such facts.

These studies utilized IATTC statistics on tuna catch distribution, tagging and recovery information, and fishing effort characteristics for vessels of certain type gear and size. Significantly, one study concluded that tagging and recovery information developed by the IATTC shows conclusively that tunas are wide-ranging and move freely across the 200-mile zones applied to the 13 countries in the eastern Pacific. Fifty-two percent of the tag recoveries from a series of IATTC experiments conducted in the fall of 1969 were made outside the zone of release. Seven 200-mile zones were involved. The study concluded that the tunas could not be managed effectively without the cooperative efforts of all countries fishing the eastern Pacific, both inside and outside the 200-mile zones.

Based upon information from the Atlantic, Indian, and western Pacific Oceans, it is clear that the situation applicable to the tunas in the eastern Pacific also applies to the tunas in such ocean regions. Extensive tagging data have been established on the temperate tunas in the North Atlantic, and considerable tagging data are being developed on the tropical tunas in the Atlantic. The highly migratory characteristic of the tunas remains unquestioned, as well as its transitory movements off coastal nations.

Figure 3 and the tables in the appendix illustrate various important facts regarding the tuna fishery in the eastern Pacific Ocean. No attempt is made to show the extensive tagging data regarding migratory movements of the tunas. This information can be obtained from the IATTC, ICCAT, and FAO.

With respect to the impact of the 200-mile fishing zone regime, it is clear that the conservation of tunas would be in jeopardy. As to the U.S. tuna fleet, the effect of the 200-mile regime would vary on the type of gear and size of vessel. Statistics compiled by the IATTC indicate that as vessel size increases so does the share of the catch taken beyond 200 miles. For vessels over 400 tons in capacity size, about 50 percent of the catch of yellowfin and 30 percent of the skipjack catch for 1969 and 1970 were taken outside 200 miles. The share for vessels under 200 capacity tons dropped to 8 percent for yellowfin and 2 percent for skipjack in the same two years. One study concluded that a limited number of large superseiners could "survive and do fairly well if excluded from the 200-mile zone of the eastern Pacific." The rest of the U.S. tuna fleet would be faced with impossible logistical and production problems. Even the large superseiners would have difficulty in solving most logistical and transit needs. In the eastern Pacific the fleets of all countries bordering such ocean would be handicapped because of the year-to-year fluctuations in the centers of yellowfin and skipjack abundance. For the Central American countries and Colombia, the handicap of being limited to very small and relatively insignificant fishing zones would be an extremely serious burden.

PURCHASE OF FISHING LICENSES

The establishment of a 200-mile fishing zone is generally proposed on the grounds that it is "exclusive" and that the issuance of fishing licenses is a matter of grace. The instability of a fishing license system is clearly established in a review of the history of such systems adopted by countries bordering the eastern Pacific. Two examples are sufficient to explain the dangers of such a system. Besides the characteristic of diversity from country to country, there also exist problems of how the system is administered.

Example: For a number of years Colombia, which claims a 12-mile territorial sea, provided a license system at the rate of about $10 a net registered ton as recorded in the ship's document for a term of 100 days. As a result of domestic pressures, the law was changed to about $120 a net registered ton for about 50 days. Besides making the price totally uneconomic, the system was so devised that a person would be required to go to Bogota and spend a few weeks applying for a license. Such a purchase procedure, and the heavy cost involved in merely paying for the right to look for fish, made the license system off Colombia totally "illusory" and effective in removing foreign fishing vessels from Colombia's 12-mile territorial sea.

Example: Mexico claims a 12-mile territorial sea and has a well-established and expertly administered license system. Nevertheless, in 1972, Mexico amended its fishing law so as to require foreign fishing vessels to hire Mexican nationals equal to 50 percent of the ship's company as

a condition precedent to the granting of a license. Such a penalty requirement, so obviously discriminatory, is designed to reduce the number of licenses issued to foreign flag vessels. It is also illustrative of the danger inherent in any fishing license system.

These two examples indicate that the "power to issue licenses is the power to destroy." This danger would be compounded under a 200-mile fishing zone.

CONCLUSION

For the tuna industry, the 200-mile fishing zone concept would cause more problems than it solves. It would lead to an irrational, unstable, and uneconomic arrangement for the utilization and conservation of tunas. The impact of such a concept on the U.S. tuna fleet, with or without a license arrangement, would create production uncertainty and therefore, economic instability.

Appendix Table 1. Area within CYRA zones
(Area dentro de las zonas del ARCAA)

Country	Number and percent of square nautical miles within: 12 mi		12-200 mi		200 mi		% of CYRA within 200 mi
Chile	8,765	6.0	220,538	11.2	229,303	10.8	4.6
Colombia	8,385	5.6	90,201	4.6	98,586	4.7	2.0
Costa Rica	6,651	4.5	151,232	7.7	157,883	7.5	3.1
Ecuador	17,623	11.9	295,744	15.0	313,367	14.8	6.3
Mexico	58,802	39.6	654,952	33.3	713,754	33.8	14.2
Panama	10,900	7.3	38,128	2.0	49,028	2.3	1.0
Peru	18,621	12.5	227,601	11.6	246,222	11.6	4.9
U.S.A.	10,322	7.0	94,555	4.8	104,877	5.0	2.1
Nicaragua	2,822	1.9	14,437	0.7	17,259	0.8	0.3
France (Clipperton Is.)	706	0.5	124,161	6.3	124,867	5.9	2.5
El Salvador	2,556	1.7	22,293	1.2	24,849	1.2	0.5
Guatemala	2,232	1.5	31,604	1.6	33,836	1.6	0.7
TOTALS:	148,385	100.0	1,965,446	100.0	2,113,831	100.0	42.2

% of CYRA inside 200 mi	42.2
% of CYRA outside 200 mi	57.8
% of CYRA within 12-200 mi	39.2
% of CYRA within 12 mi	3.0

Area outside of 200 miles but within CYRA

Degrees of latitude	Number of square miles	% outside 200 miles
0° - 4° N	293,275	10.1
5° - 9° N	482,995	16.6
10° - 14° N	332,590	11.5
15° - 19° N	67,032	2.3
20° - 24° N	113,819	3.9
25° - 29° N	55,785	1.9
30° - 34° N	19,454	0.7
35° - 39° N	0	0.0
0° - 4° S	329,585	11.4
5° - 9° S	546,186	15.7
10° - 14° S	155,324	5.4
15° - 19° S	207,612	7.2
20° - 24° S	231,355	8.0
25° - 29° S	153,800	5.3
TOTAL	2,898,812	100.0
TOTAL WITHIN CYRA =	5,012,643	

Appendix Table 2. Catches of yellowfin and skipjack tuna by zones in CRA, 1967-1971 (1,000's short tons)

	Within 12 miles	12-200 miles	Within 200 miles	Outside 200 miles	Total CRA	% within 200 miles
Yellowfin						
1967	10.0	64.3	74.3	15.3	89.6	82.9
1968	7.1	86.5	93.6	21.0	114.6	81.7
1969	6.5	73.2	79.7	46.8	126.5	63.0
1970	11.8	85.1	96.9	45.8	142.7	67.9
1971	8.5	76.5	85.0	28.2	113.2	75.0
Skipjack						
1967	17.7	114.5	132.2	0.3	132.5	99.8
1968	8.9	65.1	74.0	3.7	77.7	95.2
1969	10.3	48.1	58.4	5.8	64.2	91.0
1970	7.9	42.0	49.9	5.6	55.5	89.9
1971	9.7	92.3	102.0	11.3	113.2	90.1
Both species						
1967	27.7	178.8	206.5	15.6	222.1	93.0
1968	16.0	151.6	167.6	24.7	192.3	87.2
1969	16.8	121.3	138.1	52.6	190.7	72.4
1970	19.7	127.1	146.8	51.4	198.2	74.1
1971	18.2	168.8	187.0	39.5	226.4	82.5

Appendix Table 3. Yellowfin tuna estimated to have been taken within 200-mile zones and beyond 200 miles

Country	1967	1968	1969	1970	1971
United States	0	10	0	9	25
Mexico	43,328	42,774	40,248	61,424	22,740
France	107	82	6,559	2,594	2,565
El Salvador	1,539	10,316	501	276	1,455
Guatemala	4,916	11,580	6,484	551	3,647
Nicaragua	168	2,121	303	77	1,308
Costa Rica	4,009	10,229	9,480	10,662	21,712
Panama	505	147	698	426	1,202
Colombia	1,567	499	4,644	999	1,805
Ecuador	9,888	11,843	7,241	12,239	19,456
Peru	8,299	3,989	3,531	7,624	9,052
Chile	0	0	0	0	0
TOTAL	74,326	93,590	79,689	96,881	84,967
Outside 200 miles	15,323	21,023	46,823	45,821	28,189
TOTAL CRA	89,649	114,613	126,512	142,702	113,156

Appendix Table 4. Skipjack tuna estimated to have been taken within 200-mile zones and beyond 200 miles

Country	1967	1968	1969	1970	1971
United States	11	3	5	37	0
Mexico	37,422	7,747	8,628	26,417	16,647
France	0	13	2,109	421	380
El Salvador	152	7,252	5	0	1,011
Guatemala	101	2,907	0	8	567
Nicaragua	15	1,298	9	167	1,489
Costa Rica	204	14,823	995	968	18,554
Panama	249	950	10	8	2,510
Colombia	1,126	1,441	2,506	707	1,831
Ecuador	58,606	25,852	29,601	15,264	42,382
Peru	34,298	11,677	14,487	5,867	16,575
Chile	0	0	0	0	0
TOTAL	132,184	73,963	58,355	49,864	101,946
Outside 200 miles	305	3,721	5,837	5,552	11,295
TOTAL CRA	132,489	77,684	64,192	55,416	113,241

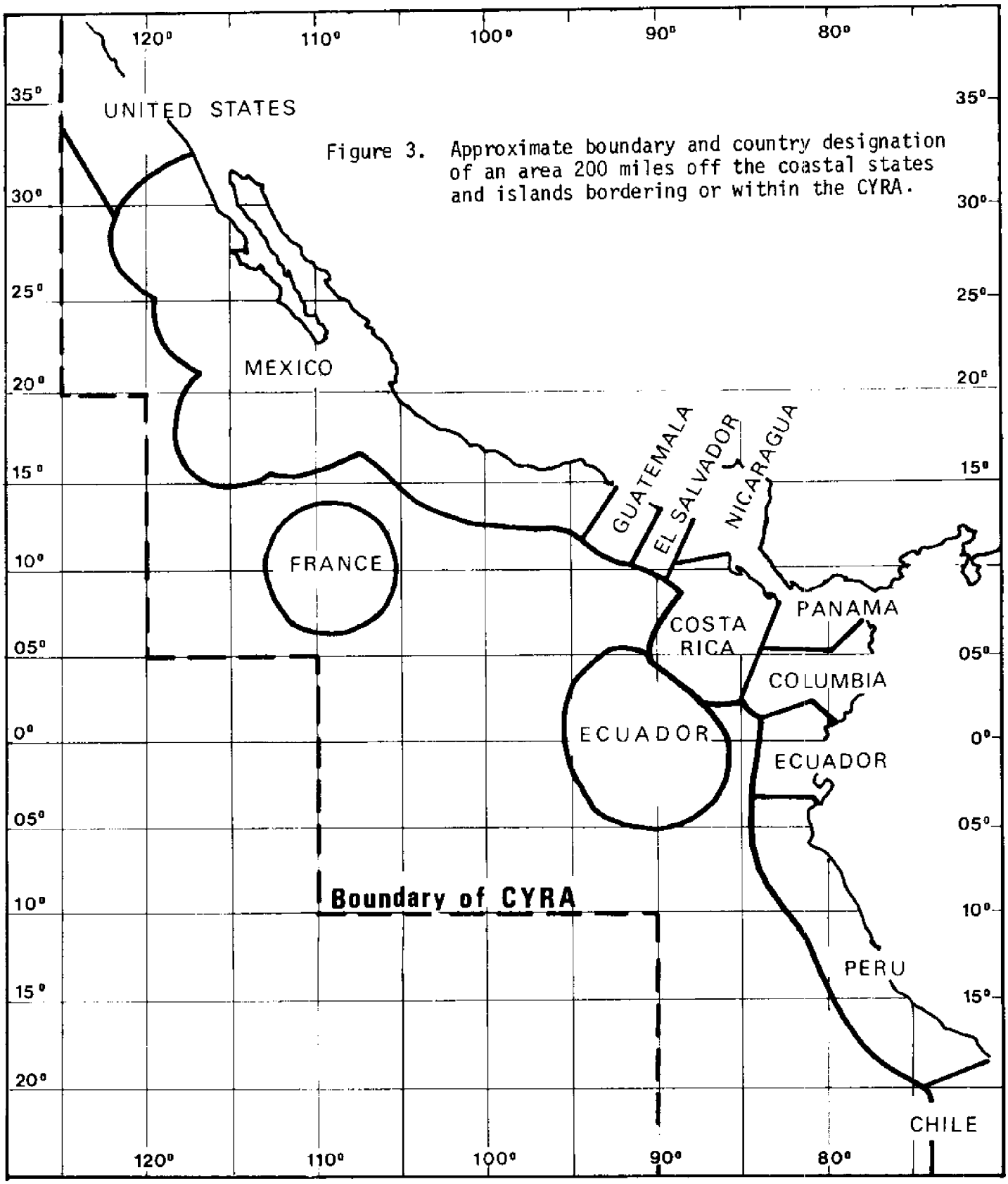


Figure 3. Approximate boundary and country designation of an area 200 miles off the coastal states and islands bordering or within the CYRA.

FISHERIES USES OF THE SEA

Industry Interests

Walter Yonker
Executive Vice President
Association of Pacific Fisheries
Seattle, Washington

Salmon Industry Interests

The two previous speakers have addressed themselves to the interests of two segments of U.S. fisheries in the proposed Law of the Sea Conference. I would like to discuss another interest, anadromous fish, which is also a consideration in the U.S. draft of a fishery article tabled in Geneva last August. This is a unique resource with unique and acute problems in an international conference.

As you may know, this draft fishery article addressed itself to protection of anadromous fish and to the right of the nation of origin to harvest such stocks according to the ability of their flag vessels. The anadromous fish of greatest importance to the United States is the Pacific salmon, although river herring, shad, and Atlantic salmon support significant commercial and sport fisheries.

The Pacific salmon is the third most valuable edible fish landed in the United States. At present the fishery is offered some protection because of a tripartite treaty between Canada, Japan, and the United States which prevents Japan from fishing salmon east of 175° West Longitude. This fishery is not subject to high seas fishing by the USSR because the Soviet concept of salmon management and harvest is similar to that of the United States.

The only reliable and economic way to harvest salmon is to take them near their rivers of origin. In the first place, to provide for perpetuation of the resource, adequate escapements must be provided so there will be sufficient spawners in each individual spawning stream to continue the runs.

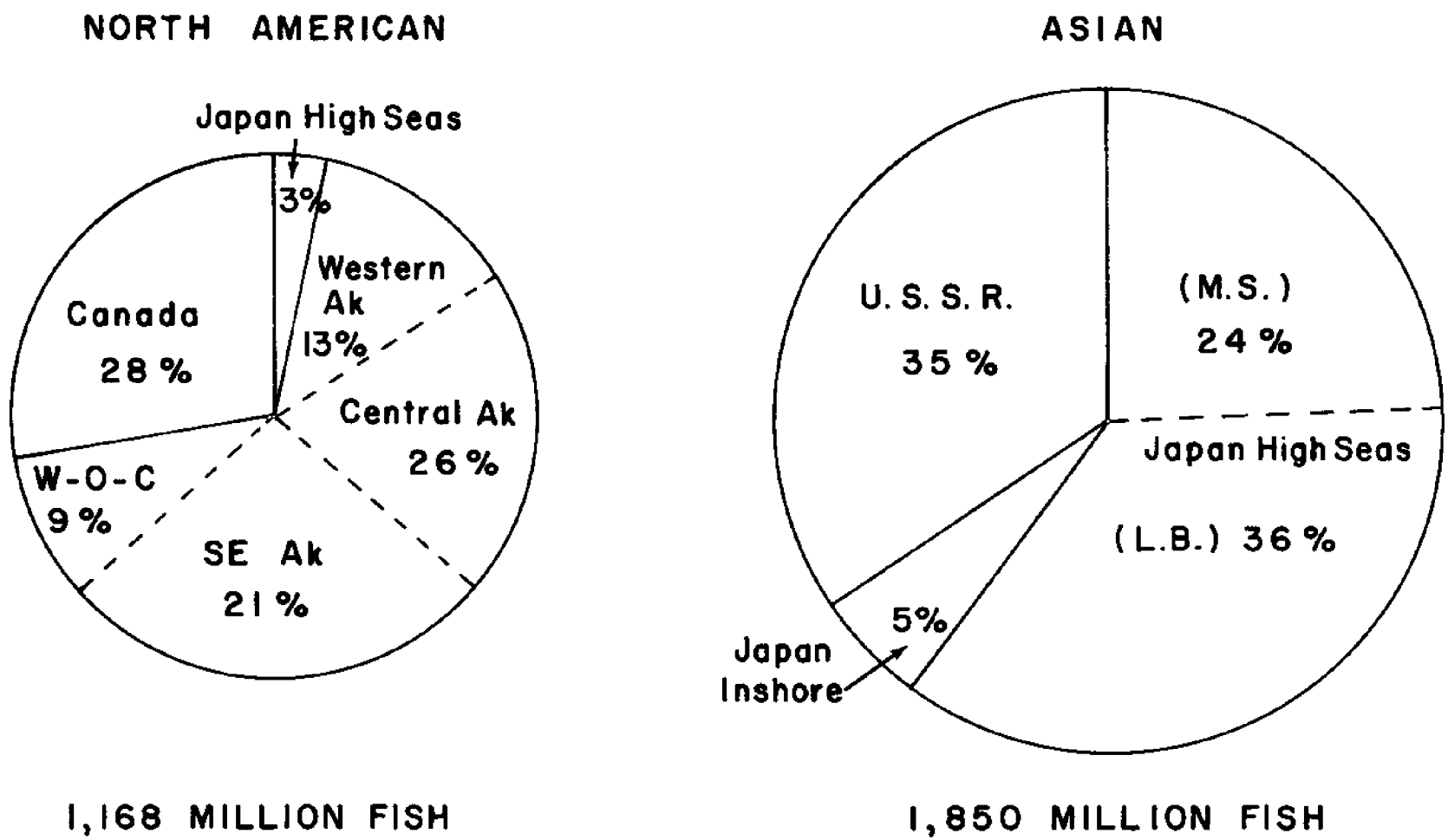


Figure 1.

CATCHES OF NORTH AMERICAN AND ASIAN SALMON, ALL SPECIES AND 1954 TO 1968 COMBINED AND PERCENTAGES TAKEN BY FISHERY - AREA - COUNTRY

(From Fredin, unpubl. MS., NOAA, NMFS, Seattle, WA)

A high seas fishery for salmon cannot be properly selective in its catch so that it would be possible in such a fishery to take an entire run returning to one river system.

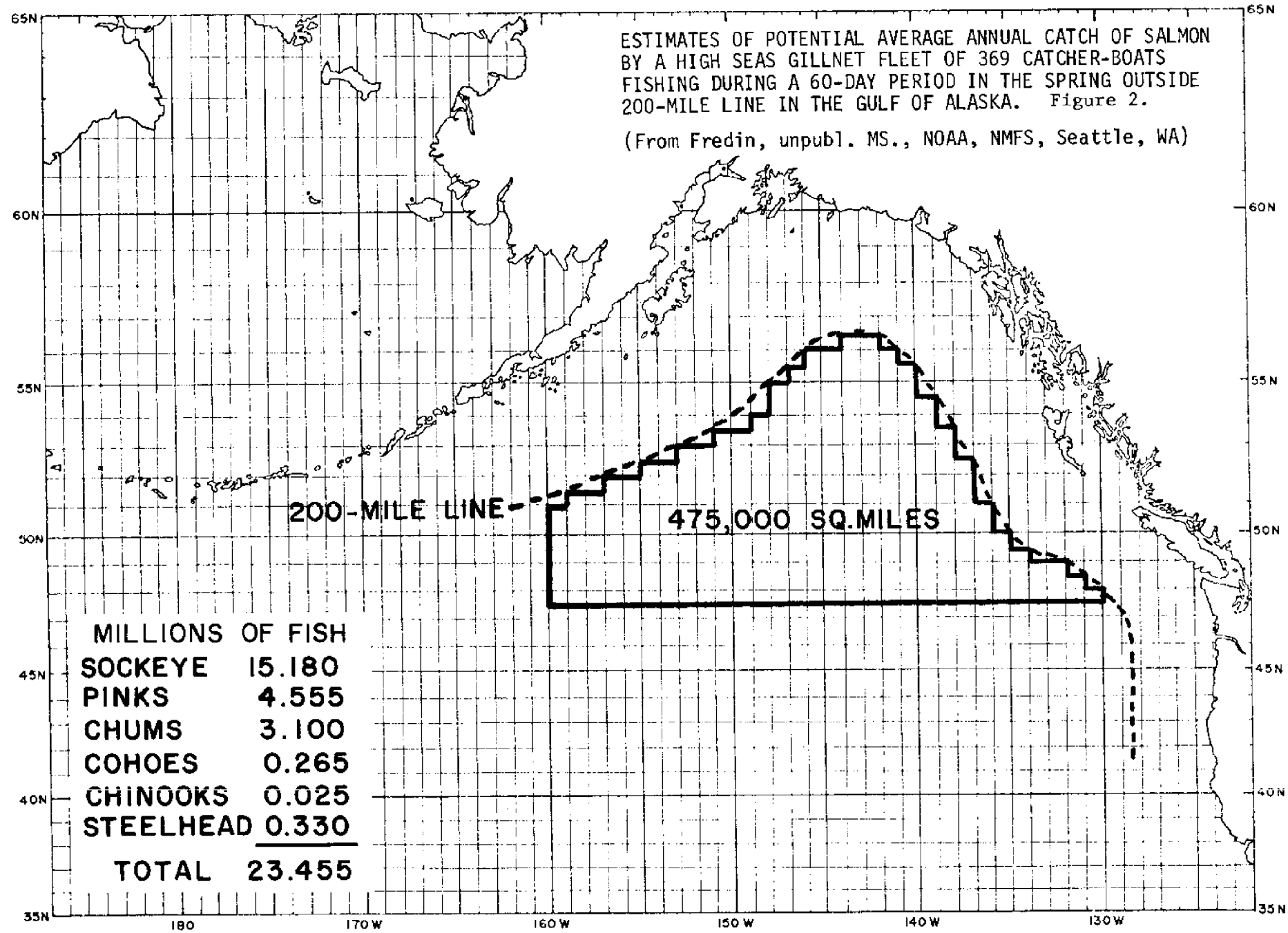
Second, a high seas fishery for salmon takes fish while immature. Such a fishery, for example, would take salmon averaging 3 pounds in weight while the same fish taken by an inshore fishery could average 5-1/2 pounds. When we consider, then, that Japan's average annual catch of U.S. salmon is about 3.5 million fish, the loss in actual landed weight could be some 8 million pounds per year.

Third, the high seas salmon net fishery is wasteful because of a high loss of fish from the nets. This fishery uses gill nets--large meshed nets which catch the fish by the gills when the fish thrusts its head through the openings in the net. On the high seas the nets "work" or move in the large ocean swells and salmon in the net drop out and are lost. The number of dropouts is increased when the nets are brought aboard the fishing vessels. U.S. scientists estimate that there may be a 35 percent loss of salmon in this manner in a high seas fishery.

Finally, the United States spends large sums of money annually to perpetuate this valuable resource. Because salmon require pure water for proper egg growth and survival of fry, considerable effort and money are expended to preserve water quality. This affects other industries such as logging where restrictions are placed on that industry to prevent damage to salmon-spawning streams. The same applies to mining, road-building, etc. In addition, sizable expenditures are made to improve access to spawning grounds by stream improvement, such as removing log jams, and by constructing fish ladders to allow passage of spawning salmon around man-made obstacles, such as dams. Considerable money is also spent to enhance spawning grounds by cleaning stream beds and constructing spawning channels. The U.S. fishermen also may have curtailed incomes because of the regulation of the salmon fisheries to provide for proper escapements, which in some years can amount to total closure of commercial fishing in selected areas.

The draft fishery article tabled by the U.S. in Geneva proposes that, in the case of anadromous fish, the country of origin shall have the authority to regulate and have preferential rights to such resources beyond the territorial sea throughout their migratory range on the high seas, and in addition, the coastal state may reserve for its flag vessels that portion of an anadromous resource it can harvest. The article further provides that the coastal countries shall negotiate with other countries when anadromous fish pass through the territorial waters of such a country and that the coastal country shall make provisions for harvest of anadromous fish by others when it is not able to fully utilize the resource.

This position, as you can see, provides maximum protection for anadromous fish in terms of the host nation. In Geneva this past summer, several countries spoke, either directly or indirectly, to the U.S. proposal on anadromous fish. The Peoples Republic of China believes that all fishery resources outside the territorial sea belong to the international community. Denmark, Japan, and Sweden take the position that because anadromous fish gain 90


ESTIMATES OF POTENTIAL AVERAGE ANNUAL CATCH OF SALMON BY A HIGH SEAS GILLNET FLEET OF 369 CATCHER-BOATS FISHING DURING A 60-DAY PERIOD IN THE SPRING OUTSIDE 200-MILE LINE IN THE GULF OF ALASKA. Figure 2.
(From Fredin, unpubl. MS., NOAA, NMFS, Seattle, WA)
200-MILE LINE
475,000 SQ.MILES
MILLIONS OF FISH
SOCKEYE 15.180
PINKS 4.555
CHUMS 3.100
COHOES 0.265
CHINOOKS 0.025
STEELHEAD 0.330
TOTAL 23.455
65N
60N
55N
50N
45N
40N
35N
180
170W
160W
150W
140W
130W

percent of their weight on the high seas they should be subject to international harvest. Canada, the USSR, Australia, and New Zealand hold positions similar to that of the United States for anadromous fish. The Australian and New Zealand position was of particular interest because, although they do not have significant anadromous fish themselves, they believe that the expenditure the host state makes to perpetuate and maximize the runs of these fish gives a proprietary right to the country of origin.

In recent years there has been a growing interest in some segments of this country's fishing industry and others regarding extended fishery jurisdiction for the United States over its coastal waters. This concept, whether it addresses itself to a 200-mile jurisdiction or other distance from our coast or a depth jurisdiction, serves as a solution to only a part of the problems of jurisdiction for the fishing industry.

The concept of extended fishery jurisdiction to some set mileage off our coast or to some set ocean depth would obviously protect creatures which inhabit these areas, but the real problem to be faced by the United States is to arrive at a fishery position on jurisdiction which protects, as far as possible, all of the fishing interests of this country.

To illustrate this point, the nation's fishery on Pacific salmon could be decimated under the provisions of a 200-mile limit, so we might consider the consequences of such a regime in terms of the salmon fishery. Under a 200-mile regime, Japan, for example, could not recognize both the 175°-line and the 200-mile limit.

According to data from the National Marine Fisheries Service, Japan, under the provisions of the International North Pacific Treaty, has taken about 3.5 million salmon yearly of North American origin, based on a 15-year average. At the same time the Japanese high seas and shore-based fleets without such control have taken about 65 percent of the salmon of Asian origin. (*See* Figure 1.)

If the Japanese fleet were to fish for salmon in the Gulf of Alaska with its present fleet of 11 motherships and 369 catch boats for 60 days, it would have the capacity of taking approximately 23,500,000 salmon of North American origin.

The National Marine Fisheries Service estimates this take as follows for the Japanese high seas gill net fishery operating outside of a 200-mile limit for a 60-day fishing period in April, May, and early June. (*See* Figures 2 and 3.)

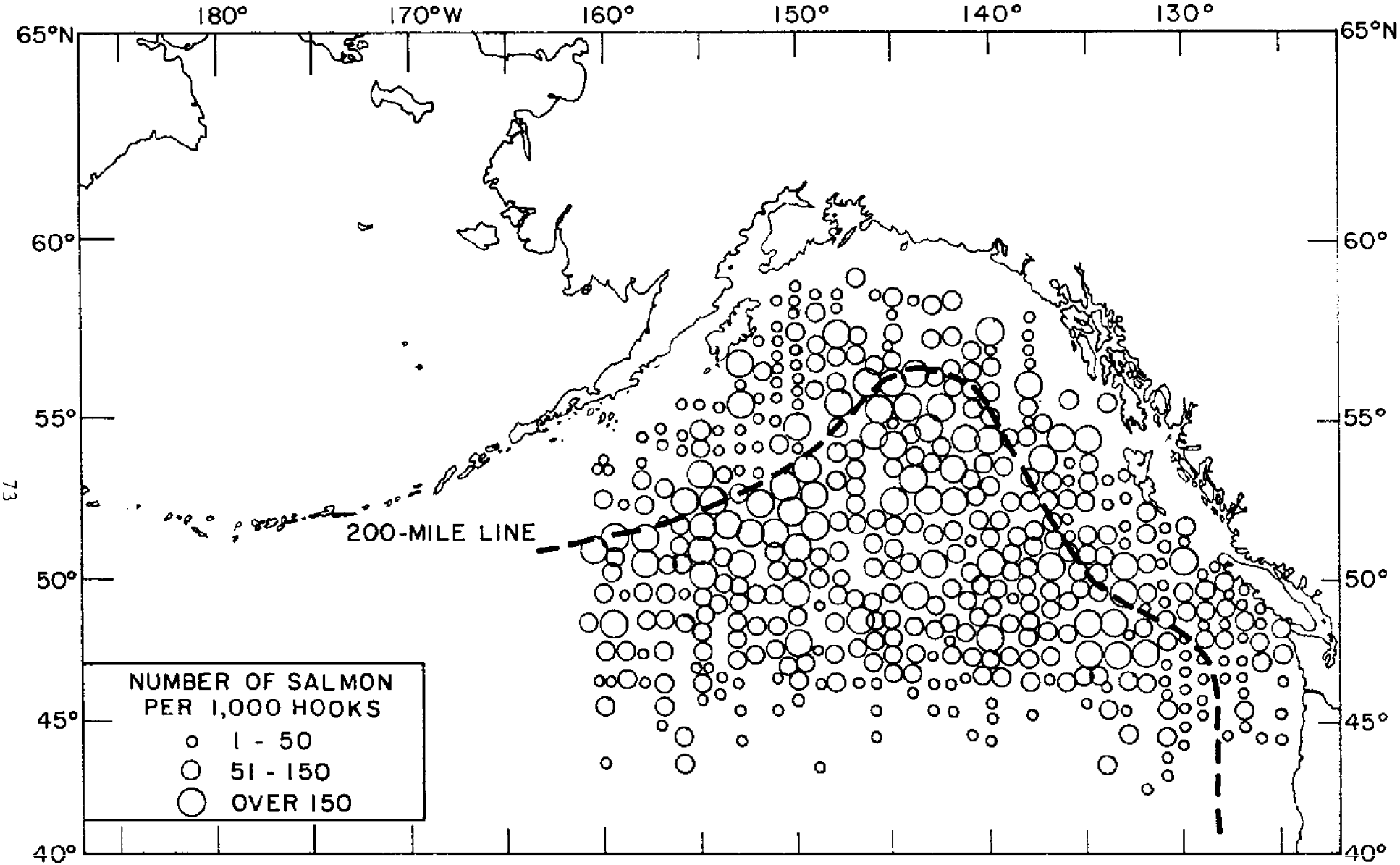


Figure 3.
DISTRIBUTION OF SALMON IN THE GULF OF ALASKA DURING APRIL, MAY AND EARLY JUNE
1962-1966 LONGLINE SURVEYS (ALL SPECIES COMBINED)
(From Fredin, unpubl. MS., NOAA, NMFS, Seattle, WA)

Species	Catch in pounds
Sockeye	15,180,000
Pinks	4,555,000
Chums	3,100,000
Cohos	265,000
Steelhead	330,000
Chinook	25,000

These estimates show clearly that a 200-mile line by itself would not provide the degree of protection for North American salmon stocks that is now afforded by the abstention line at 175° West Longitude.

I submit that to allow such a catch off our shores would drastically reduce North American salmon runs and create complete chaos for both the American and Canadian salmon industry. Additionally, the salmon fisheries of Alaska, Washington, and Oregon are of vital economic importance to the fishermen, processors, and supporting industry of the Northwest as well as to the governmental taxing authorities.

For the above reasons, the salmon industry fully supports the U.S. position on fisheries as set forth in the Draft Article III of Geneva, 1972.

FISHERIES USES OF THE SEA

Government Approaches

Dayton L. Alverson
Director, Northwest Fisheries Center
National Marine Fisheries Service
Seattle, Washington

This morning we heard from individuals regarding their concept of an idealistic solution to the Law of the Sea Conference, and last night we heard Ambassador Pardo's proposal for internationalization of ocean space--a concept set forth to bring about an improved legal order for managing ocean resources and man's activities in ocean space. We also heard this morning a viewpoint of one member of the fishing industry.

Now that we have been educated as to what the Law of the Sea ought to be, let us examine the present U.S. fishery position for the Law of the Sea Conference and consider how it emerged. You can judge for yourself whether the U.S. position tends to provide the ingredients that many of the speakers have suggested should be incorporated into a Law of the Sea treaty. I am presenting the U.S. position--and not necessarily my personal view of what the U.S. fisheries position should be. Before terminating my talk, however, I will change hats and allow myself to make a few comments regarding some issues raised today and to present my own views as to where I think this conference will lead us.

I think it would be fair to state that the U.S. position, like many other national positions, emerged first from a consideration of what constitutes the fishing system in the United States, that is, evaluation of the interests of the various fishing groups. It is obvious that this has been taken into consideration in the first approach to a U.S. position. From there we must stir in the ingredients of the global fishing system and the positions, postures, and attitudes of other fishing nations throughout the world, or those nations that would like to involve themselves in the fisheries.

The U.S. position considers the major contentious issues that now confront the global community regarding the fishing problems throughout the world. I categorize these as a failure on the part of the existing legal system to deal effectively with (1) conservation problems and (2) problems of allocation of resources. The latter, until very recently, was given a secondary priority, but in my mind it is the underlying factor which is determining many national positions, including that of the United States--that is, how to allocate the resources and determine who owns the resources.

A third consideration that is accounted for in the U.S. position is that of resolution of conflicting or contentious issues that relate to the use of hydrospace. In fishing terminology, these might be called gear conflicts--that is, the tendency to use in the same areas different gear types that are generally incompatible. The issue is not so much who gets the resource or whether conservation of the resource is practiced, but confrontation over the space itself and an ability to use it by various fishing groups. Also under the contentious issues are those that were spoken of very eloquently by both Dr. Burke and Dr. Crutchfield this morning, pertaining to what the objectives should be. There certainly is no universal agreement, particularly when it comes to the question of appropriate social/economic objectives for fisheries. Another problem that has not been mentioned in any detail is the enforcement aspects of world fisheries. There is almost universal agreement that they are not what they should be. The essential questioning is whether nations are doing an appropriate job in enforcing regulations that have been brought about either at a national or an international level. There is a strong suspicion on the part of fishermen and the lay public that neither individual nations nor the international community is committed to enforcement on the high seas of the regulations they supposedly endorse.

All of the above factors enter into the development of the U.S position on the Law of the Sea. Finally, these are a variety of pragmatic items. Within the United States, will the U.S. position float? Can we draft a position that can be both accepted by the community of nations and by the U.S. Senate and endorsed as a policy of the United States? It would be desirable, of course, to develop a position that will be acceptable to the people of the Unites States and that would be endorsed by our Senate. The same factors must evolve on an international basis--that is, will the international community endorse and accept the proposed U.S. fisheries position? If it is to be accepted, it obviously has to be endorsed by two-thirds of the participants at the final Law of the Sea Conference.

Finally, the position that is established must have utility. It has to be a policy or position that is more than just an idealistic solution but must also be practical in its application and enforcement. These are the various factors that have been considered in establishing the U.S. fishing position. Within the United States, the policy has been thrashed out between major government participants having an interest in the Conference.

Such interests as national security, seabed minerals and the fluid hydrocarbons, freedom of research, pollution, and fisheries have been considered. It is obvious again that the U.S. position cannot incorporate concepts that would be a major deterrent to some other major U.S. priority goal. In this sense, it would be safe to say that fisheries will not be the number one priority of the United States in the Law of the Sea Conference.

What, then, is in the U.S. draft? I am not going to give you details because it is outlined very clearly by Donald McKernan in the subcommittee II presentation of August 4, 1972, and can be acquired from the Department of State or the National Marine Fisheries Service, if copies are desired. What does it basically embody and how does it relate to the number of objectives that were set forth here in previous speeches?

In the first fisheries draft, in August of last year, regional management groups were proposed as the major bodies to deal with the conservation and social/economic problems of the living resources of the oceans. Management would be considered according to three ecological divisions. One group would consist of species of fish and shellfish that inhabit the continental shelf and slope areas of the world--referred to in the draft treaty as coastal species. Another group would include highly migratory cosmopolitan species--referred to as the pelagic migratory species of the open ocean. Finally, there would be an anadromous species group--that is, those species that migrate as young into the open ocean and subsequently return to the freshwater areas to spawn.

It was envisioned that a better management system could be achieved by looking at these groups in total, and developing a management scheme under which the entire group was managed as a unit, rather than setting up a zonal concept that would split resources into several jurisdictional zones. Management of the highly migratory species, such as tuna, would be left to an international group. I think it is generally conceded by most parties that this would be a good idea. Under our first draft, the coastal species would have been managed by regional groups. Subsequently, we have come to the conclusion that more authority should be invested in the coastal state. The present position allows the coastal state considerable authority in managing those species that are on the continental shelf and slope. Anadromous species would also be the responsibility of the "host nation" or the nation in which the species is spawned.

The U.S. draft tries to deal with the allocation problem in terms of the concept of preferential right--that is, allowing the coastal state the right to set aside that part of a resource that it fully utilizes. This provision to deal with the problem of allocation does not cover the highly migratory species of the open ocean, but is limited in application to the coastal and anadromous species. The problem of disputes is dealt with by setting up a mandatory dispute settlement system and enforcement

is improved by providing a better framework which allows the coastal state the right to board and ensure that the international or national management schemes are being adhered to. Our "article" does not exclude the operation of foreign fisheries from the coastal waters but does provide the coastal state the management regime and preferential rights. The draft does have a specific provision stating that an objective of this particular draft treaty will be the full utilization of the resources that are available in the oceans.

This very briefly outlines the U.S. position fishery draft. The existing U.S. proposal tends to merge with proposals that have come from New Zealand, Australia, and Canada. There are still problems that relate to allocation, and, in my view, the U.S. proposal is overly complicated. The concept brought forth by the Canadians, on the possibility of limited access, is an important one if we are to deal in an effective way with many of the allocation problems and many of the possibilities to maximize our economic opportunities from the world's ocean. In this respect, I think the U.S. proposal is somewhat deficient.

The Soviet Union and Japanese fleets now operate in the Bering Sea. I think it would be a great advantage to the United States if the Law of the Sea provided it the opportunity to limit further access to these resources. These nations are now producing the maximum sustainable yield. The entrance of other countries will further complicate the management problems and will preclude the development of a stable fishery or one in which certain revenues might be achieved in terms of paying the cost of management and providing opportunities for the coastal state to assist in its own development.

I would like to make some comments in response to Dr. Burke and Dr. Pardo, in terms of some of the aspects of internationalization and control of the oceans. There might well be merit in some of the concepts that they have set forth, in terms of internationalization of management. I would argue, however, that certain points that have been brought out have not been proved or ever supported in even a quantitative way. One of these points argues that if we go to coastal state management, we will not be able to achieve the optimum production that the world's ocean might be able to provide. Certainly this is a possibility, but I think, on the other hand, that chances are just as good under coastal state management as they are under international jurisdiction. The opportunity to stimulate fisheries, to provide a fisheries stability, and to provide for a limited entry concept are much better under coastal state management than they are under the international community.

I do not think there is any evidence, to date, that extended jurisdiction, particularly over coastal species, necessarily means that we cannot achieve the optimum production from the oceans. Similarly, one cannot

say that it cannot be achieved under the international system. But the failures that Drs. Burke and Pardo alluded to result from the fact that the inter community has not been willing to divest itself of certain authorities that should be embodied in the international system, if it is to work. Failure to divest from a national point of view into an international system reflects a certain reluctance on the part of the world community to trust international commissions to protect effectively the special interests of the coastal state. I do not envision international takeover, in terms of fishery management without a very strong national voting control, much as it exists today. We will then still have management by committee, and thus a failure to make timely management decisions. I think there is as much to fear in that sort of system as there is to fear in the extension of national jurisdiction.

Regardless, my position lies somewhere between complete coastal state jurisdiction and nationalization. In the long run, achieving the goals that Dr. Burke laid out perhaps can be best achieved through greater investment in an international authority with sets or principles which will govern the management aspects of fisheries. I think, however, that perhaps the nationalization of the coastal zone--or providing the coastal state with certain custodianship concepts, if you will--or the right to manage it, must be a first step to achieve this. Coastal state control may evolve into regional bodies which can achieve the types of goals that Dr. Burke laid out and, perhaps, in the long run it will set a course for an international set of rules governing the use of the oceans.

In conclusion, there were several comments by speakers today about the use of fees and redistribution of these fees to the landlocked countries, and to provide greater opportunities for developing countries. I do not deny that this is a lofty objective on the part of the world community. I wonder, however, if this differs from the exploitation of terrestrial resources or wealth in general. It is a symptomatic problem of the world today in redistributing wealth in an equitable fashion. I am not sure the right answer to that particular question is to start in hydrospace and say that this is the place where redistribution of wealth should take place, because it compounds another set of objectives that relate to effective conservation of the ocean's resources and management, in terms of social/economic objectives. Perhaps the redistribution of wealth can be achieved in another manner without compounding the problem of the Law of the Sea Conference. In a pragmatic way, the attitudes of the nations of the world suggest that we will have to take into consideration the very strong, vested interests in coastal countries, and, in time, this may evolve into something that is more desirable in terms of the academic community.

FOREIGN POLICY ISSUES

Honorable John R. Stevenson[1]
Legal Advisor
Department of State
Washington, D. C.

It is a great pleasure to be here today to speak to you about the coming Law of the Sea Conference, and what it may mean to us as Americans.

There has been a growing public awareness of the importance of the oceans to our lives. But I think many here would agree that the general awareness does not yet match the true level of its critical importance to a wide and increasing range of our national interests. There is, however, a special sensitivity to ocean problems here in the Pacific Northwest.

Here we have a major port, and a major segment of our fishing industry. Concern about marine pollution is strong. Both the government and private industry conduct important activities related to our national security. Both senators from Washington are chairmen of committees that are deeply concerned with federal laws and policies regarding the oceans and their resources. Congressmen Pelly has a long record of interest in the oceans, and we were pleased to have him present in Geneva this summer during meetings of the U.N. Seabed Committee. The University of Washington has been a leader in contributing to the study and knowledge of the oceans, and the related scientific, economic, technological, and legal disciplines. Thus, Seattle is an especially appropriate city for a meeting of this sort, and the University of Washington a particularly suitable site.

Before addressing ocean problems specifically, let us stop for a minute and think what life would be like in this country, or this city, or even this room if people did not agree on how they should behave. What if there were no common understanding of one man's rights and another man's duties? Some of us might adhere--perhaps ardently--to one code of behavior, while others would

[1] Present address: Sullivan and Cromwell
New York, N. Y.

have different inconsistent codes. Sooner or later there would be conflict. The conflict would increasingly involve matters, however important, that really could not justify the cost of the conflict in material or human terms. Whether by agreement--social contract if you will--or force, common rules of behavior would ultimately have to be imposed on everyone in the common interest.

In this sort of situation we have two fundamental choices--agreement or conflict. This is today the basic foreign policy issue with respect to the oceans. Today more than ever we must bear in mind President Nixon's firm warning of May 1970: If the Law of the Sea "is not modernized multilaterally, unilateral action and international conflict are inevitable."

Let us remember in particular that most nations border on and use the oceans, and that all nations have a vital interest in their use and preservation. Neither history, nor logic, nor law permits us to conclude that one country, or one group could itself decide its rights and duties in the sea with respect to the others.

Apologists for unilateralism frequently cite the success of the 1945 Truman Proclamation on the continental shelf to make their case. They omit to say that other states whose interest might have been affected did not object. They also omit to consider the wave of unilateral claims to the seas as well as the seabeds that followed, and the disputes that have resulted. They also forget that in 1945 the world was not as well equipped with institutions that could provide a multilateral alternative as it is today.

On the other hand, the principle that no nation or group can make the decisions itself is not limited to classic forms of unilateral action. We are all aware that representation in the United Nations General Assembly, and at a Law of the Sea Conference, is equal--each state has one vote. Majority or even two-thirds votes do not necessarily reflect any real accommodation of the relevant interest involved. In short, if artificial voting majorities are resorted to, a multilateral conference becomes nothing more than the vehicle chosen by one group of states to impose its will on another. The result will be nothing but a variant of unilateral action, no more legitimate, and no more successful; except, unhappily that one more blow will have been struck at the idea of seeking international solutions to problems at a time of dangerously waning confidence in international institutions. Those whose national interests are protected by their voting strength in international forums would do well to consider whether the perceived advantages of abusing that strength are worth the price of degrading, if not destroying, the role and influence of such forums on matters that affect their interests.

I think it is fair to conclude that the large majority of the nations of the world, developed and developing, believe that multilateral agreement on a legal regime for the oceans is desirable. This was manifest in the seriousness of purpose that marked this summer's meeting of the U.N. Seabed Committee, which is charged with preparing for the Conference.

However, this does not mean agreement has already been reached on the outcome. Nor does it mean that all agree the Conference should be held soon. Strong and divergent interests are involved. The real test is not whether a Conference is called: it is whether the Conference will be timely and successful. The relationship between time and success is a critical one: on the one hand, adequate preparation is needed; on the other hand, events and technology will not stand still, and may make agreement far more difficult in the future. It is, for example, much easier to make a unilateral claim than to alter it.

There seems to be a good chance that the United Nations General Assembly this fall will establish a precise schedule for further preparatory work and for the Law of the Sea Conference. The question therefore is: what are the elements of success?

It is common to answer this question with exhortations for a spirit of good will and mutual accommodation. Indeed, I suspect that the Law of the Sea Conference will need more than an ample measure of such a spirit. But, if it is to write rules that provide the answers to real problems, the Conference must be prepared to deal with those problems honestly. It is not at all reprehensible for nations to identify their interests clearly and seek solutions that accommodate them. My own view, after three years of negotiation on this subject, is that the national interests involved are not as difficult to reconcile as formal juridical positions might indicate.

Because of the divergence of views regarding what is permitted under current international law, I think there is too great a tendency to overlook the gradual convergence of ideas on what the effect of the Law of the Sea Conference should be. In this connection, it must be emphasized that states can take a far more flexible approach to changes in the Law of the Sea affected by a widely agreed treaty than they could to unilateral changes; the danger of setting adverse precedents is minimized by the fact that the treaty itself specifies what can and cannot be done.

In some cases, there is wide agreement on a specific result. This, for example, is the case with respect to the breadth of the territorial sea. The overwhelming majority of states from all regions are supporting agreement on a 12-mile territorial sea. Of course, this support is frequently contingent on reaching agreement on an overall Law of the Sea settlement that satisfactorily resolves other issues. For example, we have made clear that, because extension of the territorial sea from 3 to 12 miles would affect many vital international straits that are narrower than 24 miles, there must also be agreement on free transit of straits used for international navigation.

In other cases, there is widespread support for more generalized objectives. Let us take the case of resources beyond the territorial sea. Whatever the divergences in various specific proposals made, it is clear that all of them contemplate increased coastal state regulatory authority and preferential rights over fisheries beyond the territorial sea. No such common

element existed at the 1958 and 1960 Law of the Sea Conferences. Similarly, broad coastal state management jurisdiction over seabed resources is widely contemplated. In both cases, of course, there are critical questions regarding the extent of international limitations on coastal state rights. These questions are, of course, the key to a successful resolution of the problem of coastal state economic jurisdiction. However, the very broad support of a 12-mile territorial sea itself indicates that at least one of these limitations is also widely supported, namely the protection of freedom of navigation and overflight in areas beyond 12 miles where the coastal state exercises resource rights.

It is also clear that there is very widespread support for the establishment of an international regime for the seabeds in the area beyond coastal state economic jurisdiction. Once again, however, there are critical subsidiary questions: what should be the nature of the regime and the structure and functions of the international seabed authority to be established?

There is also a widespread belief that the Law of the Sea Conference should make an important contribution to international efforts to protect the marine environment. The Declaration of Principles regarding the seabeds beyond national jurisdiction makes clear that the international regime for this area should include such provision. The United States has proposed international standards to ensure such protection in coastal seabed areas as well. Where ships are concerned, the problem is one of reconciling the interest in free navigation on the high seas and free transit of international straits with that of assuring adequate protection of the marine environment. This can in the United States view best be done by providing adequate measures of an international character, such as making IMCO traffic separation schemes mandatory, strengthening IMCO itself, and establishing certain general legal principles.

What then are the major problems to be resolved?

First, the problem of free transit of straits used for international navigation. In the broadest sense, the United States as well as many other nations simply cannot agree that the extension of the territorial sea can subject the transit of straits used for international navigation to the discretion of the states bordering those straits. Since for geographic reasons the use of such straits is necessary for access to and from high seas areas, the right to transit straits must be regarded as an inseparable adjunct of the right to use the high seas. In more refined legal terms, this means that while we are not insisting on complete freedom of navigation, we oppose the substitution of innocent passage for three reasons:

(1) While we are not of this view, it is apparent that certain important coastal states believe they can unilaterally determine the innocence of passage subjectively, and unilaterally determine limitations on such passage, whether for safety or pollution reasons, or for other reasons.

(2) Under the Convention on the Territorial Sea and the Contiguous Zone, to be in innocent passage, submarines must navigate on the surface.

(3) The Convention on the Territorial Sea and the Contiguous Zone does not apply the right of innocent passage to aircraft.

There are obvious reasons of national security for this position for maritime powers and their allies, and for countries that rely on a stable balance of power to ensure their own security. However, these are not the only reasons. The movement of merchant shipping, including tankers, will be critical to international trade for the forseeable future. For many nations, exporters as well as importers, the importance of such movement is so vital as to reach the level of a primary security as well as economic concern. Those who would leave interests of such magnitude to the vicissitudes of international and domestic politics around the world are inevitably inviting very serious problems.

This is not to say that the only interests involved are international. States bordering straits obviously have legitimate interests in being assured that vessels and aircraft do no more than transit their territorial sea in straits, and that their concerns with safety of navigation and pollution are met. The proposals we have made regarding international regulation of these problems, coupled with coastal state enforcement rights and strict liability, indicate that we are prepared to deal with these legitimate problems of straits states. The Soviet Union has made other proposals that I think indicate that it is prepared to do so as well.

A second set of problems concerns the nature of coastal state rights over resources beyond the territorial sea.

Under traditional approaches to the Law of the Sea, this was basically regarded as a question of limits. On one side of a line the coastal state had unlimited exclusive rights over resources; on the other side its high seas rights were essentially no different from those of all other states. The major flaw in this approach is that the coastal state is not the only state with interests on the landward side and that the coastal state has special problems regarding resources beyond the line that may not be shared by other states.

The fundamental innovation in President Nixon's Oceans Policy Statement of May 23, 1970 is that it proposes a pragmatic balancing of coastal and international interests in the same area, as opposed to the older "all or nothing" approach. While the Continental Shelf Convention was a first step in this direction separating resource rights from the territorial sea, it still represented an "all or nothing" approach regarding the resources. What we now propose is a harmonization of coastal and international interests in the context of coastal state resource management authority. If these interests can be harmonized, the limits question becomes far less contentious.

The interests of our Pacific Coast fishing industry provide a good example of the advantages of this approach.

The development of large mobile and highly sophisticated foreign fishing fleets has significantly altered the practical effects of freedom of fishing on the high seas. Serious depletion of stocks can occur rapidly. Local coastal fishermen economically dependent on coastal or resident stocks are not in an equally competitive position: they can be preempted by the distant water fleets rapidly without enjoying the same ability to move on to other areas. Understandably, these fishermen would like the United States to regulate these fisheries. For this regulation to be fully effective, it should apply to the coastal stocks wherever they may be off the coast.

The United States has important commercial and sports fisheries for Pacific salmon. The viability of these fisheries depends upon significant positive measures and restraints in the rivers and streams where they spawn. However, the salmon migrate far out to sea. If regulation is to be effective, the coastal state of origin should regulate them throughout their migratory range on the high seas.

We also have an important tuna fishing industry based on the West Coast. Tuna are highly migratory species that must be regulated throughout their migratory range. Unlike salmon spawning, that of tuna is not localized. Thus, adequate conservation of tuna requires international action; no coastal state could assure this on its own. Moreover, fishing boats obviously must follow the fish. In the case of tuna, this means operations over a wide area of the sea off the coasts of many countries. Thus, by and large an economically adequate tuna fishery of substantial size requires access to the fish off several coasts; virtually no coastal state could develop such a fishery off its own coast alone.

Finally, although important interests in this fishery are located in other parts of the country, we should bear in mind that our shrimp industry engages in significant fishing not only off our own coast but off foreign coasts. Its problems are analogous to those of foreign fishermen who have an interest in fishing for coastal species off our coast. Moreover, we should consider the conservation and economic effects on our local shrimp fisheries if all these boats were forced to return.

What all this means is that a simplistic solution cannot resolve all the relevant problems, for us or for others, in important measure, the diversity of our own interests is a reflection of the diversity that exists in the international community in general.

How then can international limitations be coupled with coastal state authority to provide an adequate accommodation? We believe a two-step analysis is needed.

First, what fisheries should be subject to coastal state authority beyond the territorial sea? For reasons I have outlined, we believe the coastal state can regulate all coastal stocks wherever they may be located off the coast, and all anadromous stocks throughout their migratory range on the high seas. This covers over three-quarters of all the world's fisheries. Because of their biological characteristics, we believe highly migratory oceanic species like tuna should be subject to international regulation.

Second, with respect to coastal and anadromous species, what should be the rights of the coastal state and what should be the obligations of the coastal state to protect the interests of other states and the international community in general? Obviously, the coastal state should have an economic preference based on its capacity to harvest these stocks. However, since fish are a renewable resource, the coastal state has no need to prevent fishing consistent with sound conservation measures for stocks it cannot itself fully utilize for the time being, and should be required to provide access to others on reasonable terms for what it cannot itself fully utilize. Some accommodation through an agreed international formula with states that have traditionally fished in an area and with other states in a region is also desirable. Finally, if states are to have the necessary confidence in the viability of such an approach, a procedure for compulsory settlement of disputes is required. This goes to the heart of the matter, because the essential ingredient is a balancing of interests, and states must be assured that the agreed balance will be subject to disinterested review.

We envisage a similar process of analysis with respect to seabed resources in coastal areas. However, the problems are different, and therefore the solutions would be different. Nevertheless, the basic premise of coastal state resource management jurisdiction subject to international treaty standards and compulsory dispute settlement remains the same.

For reasons of time, I will not develop the analysis here at great length; I have done so in other places and I am sure that many of you are aware of the considerations involved. The petroleum and gas potential of the continental margins around the world is enormous, and the world's energy needs are growing rapidly and for important environmental, economic, and other reasons, we and other coastal nations must examine this problem from a global, as well as coastal, point of view.

The international standards we contemplate with respect to seabed resources in coastal areas are indicated in the President's Oceans policy statement of May 23, 1970. In general, they would provide for:

Prevention of unreasonable interference with other uses of the oceans;

Protection of the ocean from pollution;

Protection of the integrity of investment;

Sharing of revenues with the international community; and

Peaceful and compulsory settlement of disputes.

While the reasons for most of these standards can be readily understood, I would like to dwell for a moment on one that can give rise to misunderstanding. It is obvious that anyone making an investment is interested in protecting its integrity. However, as energy becomes more important and increasingly scarce, the question takes on much broader international significance. Moreover, we are witnessing a situation in which stability of investment conditions is increasing as a factor influencing not only the assessment of the risk and rate of return, but the very decision to invest in the first place. At a time when most of the world is interested in stimulating the flow of investment capital to developing countries, at the very least we should try to minimize the effect of political factors that are encouraging precisely the opposite. The investments required for offshore oil exploitation can be very substantial. Treaty standards protecting the integrity of investment would be of great benefit to developing coastal countries that desire to attract offshore investment and maximize the potential benefit from such arrangements. It would strengthen their ability to exercise their right (which should also be guaranteed by treaty) to decide whether, by whom, and under what conditions such investment can be made. The entire international community would benefit from the elimination of a serious potential source of conflict, and indeed would hopefully share in some of the revenues generated.

Another problem area concerns the international regime for the seabeds beyond the limits of coastal state economic jurisdiction. The basic problem here is that of reconciling the interests of states with the indigenous technical, managerial, and financial capacity to exploit the deep seabeds with the interests of other states in participation in the regulation and benefits of such exploitation. These are not inconsistent objectives, but they can be made to appear so if too much emphasis is placed on theoretical or ideological considerations.

There is no dispute, at least in principle, about such matters regarding the regime for the deep seabeds as the need to assure protection of the marine environment or to provide for equitable sharing of benefits. The heart of the problem revolves around three interrelated questions: What will be the system for exploring and exploiting the resources? What will be the functions and powers of the international authority? How will the interests of different states be reflected in the decision making process of the international authority?

The desire of our citizens and others for reasonable and secure investment conditions is involved in all these questions. In the first place, the opportunity for such investment must exist. An international exploitation monopoly clearly would be inconsistent with this. Second, the international community organization must have regulatory authority to protect

the interests of the international community and to assure that conditions remain reasonable in the light of changing conditions. At the same time there must be a definite element of predictability for large investments to be made. Arbitrary action by the international organization clearly would be inconsistent with necessary predictability; in this connection, compulsory dispute settlement, including judicial review of administrative action, is an integral element of a solution. Finally, to the extent that the international authority has discretionary regulatory authority, the states with interests most likely to be affected must be assured of reasonable protection in the decision-making process.

A subsidiary problem relates to the concerns of those few states, including some developed states, that produce metals on land that are likely to be found on the deep seabeds. While our own and other economic studies indicate that deep seabed production is unlikely to lead to a reduction of world prices or have other serious adverse effects, some land producers remain concerned and have urged that the seabed authority control production and prices. This has served to sharpen significantly the concern, particularly on the part of potential investors and consumers, over the functions and powers of the international organization. Moreover, the fact that some developing countries that are consumers, and not producers, of these metals and that would share in the benefits of deep seabed exploitation, have made few attempts to assure a more balanced approach to this question has intensified the inherent difficulties in urging confidence in an organization whose powers have not yet been defined and that is not yet in operation.

Scientific research, particularly in areas of coastal state resource jurisdiction, presents still another problem. The United States and others have stated their strong belief that there should be maximum freedom of scientific research in the oceans because such research is, and should be, open and of benefit to all. On the other hand, certain coastal countries have questioned this conclusion, on the grounds of their ability to participate meaningfully in such research and in its benefits, to protect their interests in resources in the area, and to prevent environmental damage. A new and more vigorous approach to the problems of training, participation, and technology sharing may provide the basis for an accommodation that protects freedom of scientific research and assures that it is of maximum benefit to all, including developing countries. The draft seabed treaty we presented, and various statements we made, elaborate in detail on some of these ideas.

There are of course other problems as well. Some of them will not be easy to overcome. But I also do not think that success is impossible or even improbable. What is required is a translation of the general foreign policy considerations favoring agreement, that most countries share, into specific harmonization of interests with respect to each problem. I think the recent session of the U.N. Seabed Committee this summer gives us increased hope to believe this can be done: not only--or even primarily--because of its concrete accomplishments, but because of the seriousness of purpose and businesslike approach that characterized the meeting. Some of you doubtlessly have questions about that meeting and about other aspects of the Law of Sea Conference.

OIL AND HARD MINERALS

Industry Positions

Luke W. Finlay
Attorney at Law and Chairman
American Petroleum Ad Hoc Committee
on Mineral Resources beneath the Sea
New York, N. Y.

No evaluation of the U.S. national interest in the customary and conventional international law governing the mineral resources of the ocean floor can be meaningful without a thorough understanding of the importance of these resources to the nation. Yet, this is a matter that has received entirely too little attention in the many public discussions of the subject that have taken place over the past several years.

Perhaps the explanation lies in the fact that we were blessed for so many decades with an abundance of domestic energy supplies that we have come to take for granted the indefinite continuance of that happy state of affairs. Nothing could be further from the truth. By 1970, we were already dependent upon foreign fuel supplies for 12 percent of our total requirements for all forms of energy, and the outlook for a drastic worsening of this picture has led to the initiation of three major studies of the energy outlook and national energy policy: one by the Executive Branch of the Federal Government under direction from the President; a second by the Senate Interior Committee under direction from the Senate pursuant to Senate Resolution 45 of the 92nd Congress; and the third by the National Petroleum Council at the request of the Secretary of the Interior.

The subject has many ramifications and none of these studies is yet complete. An interim report issued by the National Petroleum Council in July of 1971, entitled *U.S. Energy Outlook--An Initial Appraisal 1971-1985*, concludes, however, that if nothing is done to dampen the rate of growth in domestic energy demand or to encourage an accelerated search for new domestic supplies of energy, imports of petroleum liquids will reach the level of 14,800,000 barrels per day by 1985, or 57 percent of estimated domestic requirements for

petroleum liquids in that year, and imports of natural gas, mostly in liquified form, will reach a level of 6 trillion 600 billion cubic feet per year, with indicated availability of foreign supplies being the only limit on a far larger rise.

The economic implications of such a prospect are most disturbing. With the free convertibility of the dollar already suspended because of our mounting balance-of-payments difficulties, an import requirement of this magnitude, representing a landed cost of somewhere between $15 and $25 billion per annum, could have a disastrous effect on our entire economy.

It seems clear to me that, in addition to any feasible means that may be found to dampen the growth in domestic energy demand, two other actions are called for. The first is the provision of incentives sufficient to bring about an accelerated search for new domestic sources of energy and the second grows out of the first. It so happens that the U.S. continental margin is by far the most promising source of major additions to our domestic supplies of petroleum liquids and natural gas, and hence it seems clear that we should do whatever is necessary to assure continued effective U.S. control over those resources.

The volume of potential oil and natural gas in place on the U.S. continental margin is enormous. For the area under federal jurisdiction under the Outer Continental Shelf Lands Act out to the 2,500-meter isobath, the U.S. Geological Survey has estimated original oil in place at from 1,300 to 1,580 billion barrels and original gas in place at from 3,230 to 4,450 TCF, with the distribution on the landward and seaward sides of the 200-meter isobath being approximately equal.

There is, of course, a considerable difference between potential resources in place and recoverable reserves under current technology and economics, and the U.S. Geological Survey has not yet included any part of the resources beyond the 200-meter isobath in the latter category. At the same time, offshore technology is making the kind of rapid advances that one would expect in view of the fact that one-sixth of the world's current production of oil is already coming from offshore sources. As a matter of fact, a commercial discovery has been made in the Santa Barbara Channel in water depths ranging from 1,000 to 1,300 feet and the installation of production facilities is being delayed only because of the need for ecological clearances. Accordingly, it would be grossly unwarranted to write off the future importance to our nation of the oil and natural gas lying on the portion of the U.S. continental margin beyond the 200-meter isobath.

As a member of the Committee on Deep Sea Mineral Resources of the American Branch of the International Law Association, I am in full accord with its conclusion that (and I quote):

> .....rights under the 1958 Geneva Convention on the Continental Shelf extend to the limit of exploitability existing at any given time, within an ultimate limit of adjacency which would encompass the entire continental margin.

I also share the view of Professor R. Y. Jennings of the University of Cambridge that the jurisdiction of the coastal nations over the continental slope, which is as much a part of the natural prolongation of their land mass as is the physical continental shelf, is in the process of confirmation as a matter of customary international law by virtue of the practice of coastal nations. Thus, a recent unpublished survey indicates that, including colonies and protectorates, 111 free-world political entities have awarded offshore concessions or leases and that 55 of these have done so in waters extending at least in part beyond the 200-meter isobath. Off the shores of Canada and Southwest Africa, the depths have ranged to 3,000 meters or more, and our own Department of the Interior granted a lease some years ago for the dredging of phosphorite nodules in an area on the Forty-Mile Bank off the Southern California Coast with water depths ranging from 240 to 4,000 feet and separated from the shore by an ocean floor trench as much as 4,000 to 5,000 feet deep. To the best of my knowledge not one of these actions has ever been the subject of protest by any other nation.

Both the Geneva Convention on the Continental Shelf and this widespread state practice would clearly seem to support the exclusive jurisdiction of the United States over the seabed resources of the entire U.S. continental margin. The long-range importance of these resources to the economic well-being of the nation would seem equally to dictate clearly against U.S. acceptance of any new international treaty that would impair our effective control over these resources. The National Petroleum Council in its 1971 Supplemental Report on *Petroleum Resources Under the Ocean Floor* took exception in this regard to several aspects of a draft treaty on the international seabed area that was tabled by the U.S. Delegation to the U.N. Seabed Committee on August 3, 1970. This working paper received scant support from other nations, however, and I am gratified to note that the U.S. delegation has now expressed its readiness to go along with the overwhelming sentiment of other coastal nations in favor of broad coastal nation control over seabed resources, subject only to acceptance of internationally agreed rules on a number of points of legitimate concern to the community of nations as a whole.

This position was spelled out in a speech delivered to the U.N. Seabed Committee on August 10, 1972 by your speaker of yesterday afternoon, Mr. John R. Stevenson, in his capacity as head of the U.S. delegation to that committee. The five limitations on coastal nation control which he enumerated in his speech and repeated yesterday afternoon were all drawn from President Nixon's statement on U.S. oceans policy of May 23, 1970, which called for international treaty standards:

to prevent unreasonable interference with other uses of the ocean;
to protect the ocean from pollution;
to protect the integrity of investment;
to share revenues for international community purposes; and
to provide for the compulsory settlement of disputes.

There is only one of these proposed standards on which I would like to sound a note of caution and that is the proposal to share revenues for international community purposes. We will be in no position to offer economic assistance to even the most disadvantaged foreign nation if we fail to keep our own financial house in order. In the light of the critical impact of expected future imports of oil and natural gas on our balance of payments, it would therefore seem to be ill-advised to encumber the resources of our outer continental margin with anything more than a modest commitment for international community purposes. This is not likely to be a real problem, however, as it is highly questionable whether other coastal nations will agree to a commitment of any size whatever with respect to seabed resources under their jurisdiction.

In closing, I would like to make brief reference to two collateral points. The first is the outlook for the Washington-Oregon offshore area; the second is the legislation now pending in Congress to give interim protection to American hard minerals mining operations in the international seabed area as a stimulant to activity in this portion of the sea, pending agreement on an international seabed treaty.

I don't happen to be a petroleum geologist, but I have rubbed elbows with enough of them to know that results to date in the Washington-Oregon offshore area have been negative and that this area does not have high priority in industry planning. Even so, the 11 dry holes that have been drilled to date are hardly a pin prick in the 50,000 odd cubic miles of sedimentary rocks lying off the coasts of Washington and Oregon, and it would take only one significant discovery to bring about a radical change of thinking. Witness the rapidity with which a series of billion-barrel fields have recently been discovered in the North Sea after decades of inattention, despite the immediate adjacency of the North Sea to the oil-hungry countries of western Europe. I understand that your own offshore area is complicated by volcanic intrusions and flows and that it will take a lot more exploration and drilling to give a better picture of the prospects.

The legislation to which I referred is a pair of companion bills, S.2801 in the Senate and HR. 13094 in the House of Representatives. I imagine that Mr. Flipse will discuss these bills in some depth and I will limit my remarks by saying that, with the complete concurrence of the American petroleum industry, they are limited to hard minerals mining operations. This is for the reason that the hard rock miners have a near-term interest in the manganese nodules of the deep seabed beyond the continental margins, whereas the margins themselves are the prime targets for the near-term operations of the petroleum industry, with the result that we have time to wait for an

international treaty. For example, here in our own country less than 1 percent of the U.S. Outer Continental Shelf has been the subject of comprehensive exploration and we are far ahead of most parts of the world in this regard.

Accordingly, the petroleum industry has ample prospects in the shallower and less costly water of the continental margins to occupy its attention for some years to come. At the same time, we favor legislative protection for any branch of the American mining industry that is ready for operations in the deep seabed. We also share the long-range interest of the hard rock miners that the terms of any treaty eventually negotiated for the international seabed area be such as to assure American private enterprise full opportunity of access to the deep seabed area of the world's oceans under reasonable, economically viable terms, fixed for the life of the concessions, leases, or licenses.

OIL AND HARD MINERALS

Industry Positions

John Flipse
President
Deep Sea Ventures Inc.
Gloucester Point, Virginia

It is my pleasure to talk to you today in a slightly more informal vein than Jack Stevenson's excellent presentation and Luke Finlay's very carefully prepared words. I would rather visit with you, if I may, and outline with you an industry position. As in any other area of enterprise, there is some diversity in point of view of what industry should be doing. It usually comes down to one's current position in the area. Deepsea Ventures is a subsidiary of Tenaco Incorporated, and, fortunately for our interests, they are not already involved in manganese, nickel, copper or cobalt. The companies that are currently involved naturally have a slightly different slant. However, most of the topical matters that I am going to address today, comprise an industry position where the discrepancies probably are with the "when" not really the "what" or "how."

I would like to set the stage for my discussion by giving you what we consider the premises on which American industries are entering the business of recovering minerals and metals from the ocean floor. First, we are addressing only those resources that are beyond the legal continental shelf, wherever that may be. Fortunately, the nodules with the highest assay form on the ocean floor in areas most removed from the land because they are the areas of least sedimentation and where the nodules have the opportunity to grow with the minimum degrading inclusions. We are talking about the surficial deposits today. I would like to suggest that the bulk deposits that Luke Finlay referred to, the phosphorites off the coast of California, will become economically productive in the future. Depending on the consumption of the high assay phosphorites in Florida and the increase in transportation rates, I am sure we will see the phosphorite deposits off California develop in due time.

Another bulk deposit that we are not going to talk to today are the deep ocean floor muds. Probably the Red Sea muds are the most famous and perhaps they are going to be developed in another decade or two. The lode deposits which we are sure exist in the ocean floor, veins of valuable, almost pure metals, are probably going to be discovered as collateral activities in the other mining efforts, and I suggest that these are going to be real economic resources by the end of this century.

Another premise on which we base our activity is that the ocean floor resources are an industrial opportunity. This is probably subject to some challenge. We do not feel that they are the property of any nation or group of nations or that an "international operator" is the way to go. This approach is just a matter of practicality, if nothing else. For an international group to actually go out and perform deep ocean mining operations, develop the technology, perform the exploration, and market the product defy our imagination. We also believe in a continuing free metal market. Probably the most famous is LME, the London Metal Exchange where the world prices for many metals are set. The industry position is that a competitive market in metals will continue, that it will not become a controlled market where any organization will have the right to set the price and production levels, and, lastly, that the industry feels that this is not an item for international swap or barter.

I thought Jack Stevenson addressed the question of the Law of the Sea Conference very nicely. It is a package deal, and we just want to be sure that we are not one of those goods traded to obtain a concession in some other area of U.S. interest. This, I think, is the industry attitude toward ocean mining as an industrial opportunity. We also sincerely believe, even if it sounds like vow 7 of the Boy Scout Code, that deep ocean mining is in the national interest. It is an alternate source of key metals which are currently being imported: manganese 100 percent, nickel 75-85 percent, copper, believe it or not almost 40 percent of U.S. needs, 100% of U.S. cobalt requirements, and so on. We are addressing then the alternate supply of key metals that are imported. Of course, the industry is aware of the imbalance of payments problem, and the metal supply from even a moderate operation would amount to something in the neighborhood of $150 to $200 million a year relief in the imbalance of payments. Obviously a new industry of this type will add to the U.S. tax base and will create important employment opportunities.

Let me briefly address the technology included in mining and processing manganese nodules. Despite a lot of the romantic literature that is available, mineable deposits of these minerals do exist. They are not uniform; they are not interchangeable as ore sources any more than land ores are interchangeable; they are not universally available; but there are in our own experience at least four or five deposits that qualify on very severe economic criteria as being mines. There are undoubtedly more. Further,

methods for mapping, assaying, and evaluating these mines do exist. Now it is torturous, hard work, requires a lot of time at sea, and so on, but it is possible to assay amd map these deposits.

Second, there are mining techniques available. We have adopted an airlift hydraulic system and Dr. Goldenberg has scheduled a movie this afternoon that shows a prototype operation. There is a system being developed by the Japanese called a continuous-line bucket system with an endless rope that has recently been tested in the Pacific. The sponsors are so extremely quiet that some of us are speculating, but we know that if they are out at sea, they have had trouble, which is par for the course. I am sure they will eventually announce the success, whatever that means, of this particular experiment. There are at least half a dozen additional techniques under study and development, including an appreciable effort by the Hughes Tool Company. And, lest I be misunderstood, we consider the Hughes operation serious competition to our own effort as they are a highly competent group of people.

The mining techniques themselves may vary but they all have a characteristic that should be very comforting. Let me briefly explain. The nodules form only in the cleanest part of the ocean. If there is high sedimentation or if there is a reducing environment such as a sulphide bottom , they do not form. The metals are present only as oxides and, hence, the cleanest form of metal that can possibly be mined. The beautiful part is that you can control how much sediment you bring up. Since it costs money to move it, the less you handle, the better. Sediments can be discharged below the euphotic zone. If you are mining in 15-20 feet of water, it does not really hurt much to pump the water back down 200 feet where it is beyond the light-affected zone. The water that you move is very rich in nutrients and perhaps you will generate a fish farm or an area of high biological activity, just the way the Humboldt current, the Gulf Stream and the Newfoundland current provide this kind of interaction naturally. The nonpolluting aspect, we hope, is going to switch the emotional reaction toward operations in the ocean into a favorable vein. There is some excellent independent academic work being done that supports these contentions.

Because manganese nodules are formed over a very long period of time, they are not amenable to smelting--pyrometallurgical techniques. The hotter it becomes, the more trouble in separating the constituents. There are some 31 metals in the ore, of which we initially viewed four as attractive. We now see seven as attractive. It is like the man who runs the slaughterhouse: we are trying to get everything but the squeal if it is economically feasible to do so.

A hydrometallurgical process is used; this means essentially chemical engineering which takes the nodules and puts them back into solution. Again there will be a 7- or 8-minute film that shows our process in the pilot plant if you wish to see it this afternoon. To be economic these processes must be

closed loops. You must use everything again and again. Fortunately the only things that you have to put back in the ocean are natural ocean salts which are in the water contained in the nodules and some clays and silicas which are normal constituents of the sands and the earth of the globe. The non-polluting aspect is very real, since we are designing these systems in an era when there is an acute awareness of all pollution problems. We are doing it very carefully and making certain that there are no undesirable discharges. The nature of the ore, as I mentioned earlier, helps us immensely here.

We believe that the technology we will follow, though currently developmental, will be operational on a timely basis.

Let us briefly address the markets. We are the one ocean mining company which feels that the manganese is important. All U.S. manganese requirements, about one million tons a year, are imported. Three and one half times that amount is used yearly in the world. We are looking at high quality manganese because our process produces very high purity metal. The result is that we are looking at a special market which is rapidly developing as steel technology improves, and we are looking at real growth in that market. There is no threat to the fundamental manganese production for steel making from ocean ores. We also expect this market to grow with the expansion of the population and the expansion of the steel industry which is expanding at a compound rate of five percent in the United States and seven percent worldwide. As the expectation of the lesser developed countries are met, there probably will be an increase in steel consumption and therefore an expanded market for this product.

The other products are associated with the steel industry too, but they also are measures of the world's standard of living. As the standard of living is raised, the need for nickel, copper, cobalt, zinc, and all metals recapturable from the nodules will also increase. As the standard of living rises, the steel requirements for automobiles, refrigerators, sinks, and bathtubs will also increase. The availability of these metals at reasonable prices will stimulate growth.

We also believe that the market growth for the metals is strongly influenced by the availability of the quality of ores on land. The best ores are being consumed, and since there are not as many new discoveries as in the past, it is a period where lower grade ores are used. In my opinion, there is not an impending metal shortage. If you read carefully, you will see it is normally prefaced by this statement--if prices are to remain constant, then there would be a metal shortage. This is unrealistic, if prices of copper doubled, we would probably have a copper exporting situation here in the United States because of the availability of low grade ores.

We expect that the marketplace for the metals derived from the ocean floor will be a competitive market. I have already mentioned that as one of our premises. We expect to compete in existing markets against existing sources, new sources, and I just suggested that we not write off the ocean as the last possible source. There are a series of technologies now just being developed

that are looking for alternates inside the earth, perhaps even in space, for finding key metals to supply our markets. We believe that the prices will be determined by supply and demand and as a reward for a superior product. We feel that there will be an excellent opportunity to be rewarded for a superior product.

We feel the alternate source of these metals of the ocean will be a factor in moderating the monopolistic price control tendencies of the currently producing nations. I noted that regular gasoline is 38¢ a gallon. OPEC, the organization of petroleum-exporting countries, has been able to double the price for a barrel of exported oil twice in the last four years. A similar organization has been formed for controlling copper. Cobalt is a new monopoly in the free world now and I think having an alternate source, even though it is not going to put them out of business, will keep them honest.

One of the requirements for industry to go ahead in this business is a predictable legal regime, and I put that right at the top of the list since we do have the technology. I am not locked in on what that regime should be, but you must be able to estimate the cost impact. You cannot sell a program to a board of directors that has an unknown cost factor. Therefore you see some pretty bad bargains made from time to time as an expedient. This predictable legal regime is also necessary for two other reasons. First, the confidence to get started. One thing that keeps creeping into the vernacular that disturbs me is the idea that you will be reimbursed if you are wiped out. We really are not going into this business to be reimbursed. If you cannot see a long-term on-going growth prospect, there is a very real reluctance by industry to make any major investment. Just to get your money back is hardly satisfactory. Second, this stable legal regime should assure us of the availability of the resource. When you wonder why industry may hesitate, what good is all of the equipment, the plant, the mining machines and so forth, if you would be denied through a treaty agreement, access to the resource, to the deposit? That is probably our principal concern. The protection of investment certainly is the obvious thing, but again remember that the growth possibility is also an essential.

We are also looking toward work rules that are reasonable, and by reasonable, we do not mean that they all go in our direction, but that they are well defined and constant. They are certainly going to protect the environment, we recognize that. They are certainly going to manage the resource so it is not wasted as well as prevent monopolies and exclude the speculators. We are certainly looking for work rules that will prevent this from being a speculative area where you can make an unlimited number of claims. An orderly method of settling disputes is also a requirement. I think this is about the 15th time you have heard that today and you will hear it at least once or twice more from my associate, Leigh Ratiner. The legislation, and I want to address it very briefly, we have proposed through the American Mining Congress would permit Americans to go ahead on an interim basis. It is labeled an interim bit of legislation, anticipating the international agreement, and it

welcomes others to join on the same basis. There is sincere interest in both Japan and Germany. Interim-type legislation should provide revenues for international purposes and rules to prevent interference between other users of the sea. Incidentally, in about 10 years of work we have never interfered with anyone else; in fact we seldom see anyone else, since these deposits are in the more remote parts of the ocean. We certainly are not going to interfere with the surfers.

The legislation does protect the environment, even to the point of imposing a severe economic penalty, but one that is predictable and can be lived with. The legislation ensures the integrity of investment and provides for compulsory settlement of dispute. I suggest that before you attack the bill you read it, because if you do, I think you will find that these are indeed carefully phrased, workable parts of it. The bill also supports the President's policy statement of May 1970, which Jack Stevenson referred to. We feel that it is a strong support for that policy.

I think we have shown our sincerity in our support of Jack Stevenson's effort. I am a member of his interagency advisory task group and honored to have the chance to work with him. We are not trying to compound or make his negotiating problems more difficult; we are trying really to help. I would like to state strongly that this legislation is not a counter-productive unilateral act. I differ with Jack Stevenson regarding the progress in the United Nations.

If you take the half-dozen tasks assigned by the General Assembly to each of the subcommittees of the law of the sea committee and put down work accomplished, the results are minimal. They have done some work; bracketed very widely divergent language in some areas, and where there is no agreement, they have perhaps defined the issues. If you look at the list of topics, you will find that they are good, bad, and indifferent; all extreme positions are shown in that list of topics. In addition, there are 15 other topics where no work has been done. Remember this is in preparation for the U.N. Law of the Sea Conference. It is hard for us to believe that there will be a conference in the near future that will be constructive enough to produce the legal environment that we need to go ahead. We are not very thrilled by the recent acts of expropriation by Latin American nations of American industrial operations within their lands. So I suggest that having interim legislation, rather than a moratorium, is productive rather than counter-productive. Additionally, I think the legislation is important because it provides a two-tier system. We believe that American industry should relate to the American government. We find a Leigh Ratiner hard enough to get along with, much less a committee of 27 different nationals in some remote place where they meet twice a year. We would like to be able to work with our government and have our government work in the international area. That is what they are there for. Therefore our legislation suggests a two-tier relationship, and I think that is essential to successful day-to-day operation. We can live with the government, our government. Other nationals can live with their governments so let the governments do the negotiating on the major issues.

I would like to point out that these bills were prepared at the request of Congress in the absence of activity in the executive side of the government. I think there is a direct benefit to the public in this because it will permit U.S. industry to get into this business and compete with no public revenue support. The technological effort in Germany is supported approximately 90 percent by the government and in Japan, though it is a little more difficult to determine, we suspect that it is at least 75 percent. We do get some write-offs for tax purposes, so do not let me suggest that we are absolutely without support. On the other hand, the bill permits us to go ahead without government funding. Believe it or not, I sincerely think that approaching a problem of this kind through legislation is about as "American" as you can do it because it invites both constructive and nonconstructive criticism. The issues should be aired as I think is being done.

Let me discuss for just a minute the international regime. It is our ultimate goal, because it will probably provide the most permanent type of operation imaginable. If the international regime can ever be agreed to, they will never be able to agree to change it. Therefore, we will have the stability we are looking for. We would like to state that we have designed the legislation to be interim, so it will plug into what we feel is a reasonable American position and will not be too hard to modify if it does not dovetail exactly into the international regime.

Let us now discuss the timing of this international agreement or international regime. From 1967 to 1972 we have had a lot of talk, some of which has been substantive. It certainly has polarized the interests of the lesser developed countries, the developed countries, the "haves" and the "have-nots." The thing that amazes the U.S. industry is that the U.S. government is in a hurry. Their position is that we must have a Law of the Sea Conference soon. I have never bought a horse or a car when I was in a hurry, and still felt that I got a very good deal. Far be it from me to criticize the American strategy in this approach, but I would like to suggest that the industry is in more of a hurry than the U.S. government, because U.S. industry has funded their technology development from the beginning. U.S. industry is the one that suffers, not the Japanese industry or German industry, so we are in more of a hurry than our government, for the ultimate regime.

We are scared to death of being one of the trade-offs. I will give you "zis" if you give me "zat." We just do not want to be "zis." We are scared. We think that since there is no revenue currently being derived from deep ocean ores, somebody could give them away saying, "I am not giving away anything, really." I even heard it suggested at this conference that we could give away the fisheries--that except for our coastal fisheries, it is only tuna. Tuna actually is much more important today than ocean ores. We are scared that there will be a metal market control. If there is even an agreement to control the price or the production level--which is the same thing since

if you control the production level you can control the price--of world metals to put in an international organization instead of a freemarket, I believe that American industry as well as the public will suffer severely.

One of the things that I have a hard time understanding, and I have lived with this program now for some years, is equating the common heritage to common property. What's the difference between a "heritage" and "property" except the timing? When grandmother dies it becomes my property; right now it is my heritage. This mental attitude has clearly developed, and we are not talking about equal rights to this resource any more, we are talking about ownership of the resource itself. If you have two horses, do you think it could be settled easily? Hardly, because if it is the common property, I own one leg of each horse and so do you. It gets into a very interesting, very difficult discussion. I think this is inherent to the prolongation of these law of the sea discussions and it is one of the risks of continuing them on a very long basis.

A year or two ago it was our government that was worrying about creeping jurisdiction. It came up very suddenly in Jack Stevenson's talk and in Dr. Pardo's speech. Dr. Pardo explained to me that he felt that if we could establish the interest of the world community in the ocean floor, it naturally would be established in the water column, the sea surface, and the air above. It just has to follow. It is just a matter of time. We can put an economic penalty or rent or charge on the sea floor material right now. It looks like it is an easy thing to achieve. We could subsequently charge "ton miles" for tanker travel and "passenger miles" in the air as the way to correct the inequities of world economics. Perhaps this approach is realistic, but I feel in our current negotiations, it is a real risk.

Let me conclude then by just stating what I think is the industry position. The time is now; the technology is ready. The United States is aware of its metals resource needs. The energy crisis has helped us in this awareness. The metal monopolies are aggressive, they are not passive. We see the benefits as very real--it will stabilize certain metal prices, provide alternate sources of these metals, develop a new industry. It certainly will benefit all mankind because those nodules have been down there for 30 million years and they have not done anyone a bit of good yet. If you let us develop the technology, although someone else will be able to follow, we will enjoy a lead. We will not have a monopoly, so mankind will benefit when someone is capable of bringing those ores up and winning the metals. It may not be a space victory, but it is a technological achievement and we are in competition with other developed countries. We can assure you that it will reduce the pollution of our earth, air, and sea.

American industry believes that ocean mining in this decade is the objective and not the means. I think we will prove again that we can be flexible if we are given the opportunity.

OIL AND HARD MINERALS

Government Proposals

Leigh S. Ratiner
Director, Office of Ocean Resources
Department of the Interior
Washington, D. C.

I came prepared to give you a lively argument but Jack Flipse was so disarmingly reasonable today that I find that most of my notes are probably useless. In fact, I was frightened to death by some of the things that both he and Luke Finlay said because I had the same things written down in my outline. I even used some similar statistics though our statistics occasionally vary from industry's statistics.

I won't waste too much time telling you about mineral resources of the seabed--you have heard about them. But I think that perhaps if we could part for a moment from statistics and just look at our long-range interest in minerals, it might be helpful to your understanding of the stakes in this negotiation. I was amused to find that we had seven speakers on fisheries yesterday and only three speakers on minerals today. I think the magnitude of the resource is not well represented by our numbers; hopefully, it will be by the quality of our statement.

I also notice from the paring down of the audience today that the local impact for the Pacific Northwest is obviously believed to be fisheries. I would heartily dispute that. I don't think the local impact is minerals, either. I think the local impact is something far more important than any commercial interests or resource interests of the United States. I think you heard some of that from Jack Stevenson yesterday, but I'll say more about that a little bit later. Oil runs our machinery and heats our homes. It is as essential to us as food. That didn't used to be true but

it is true today. Food is a serious problem as population grows, but oil--oil is a problem even if we don't grow. Even if our population growth is zero, we will find new ways of brushing our teeth with electricity; we will find new devices for our homes; and we will need oil in order to continue living that way. We may not live very wisely but we don't show any signs whatever of turning around and living some other way; so oil is here to stay.

We will develop alternative sources of energy as the years go by, but I don't foresee that one day we will eliminate our dependence on oil. And for the moment, we are predicting, as you heard from Luke Finlay, that by 1980-85 we will be more than 50 percent dependent on imported petroleum, and a good deal of the petroleum will come from the Middle East by that time.

With respect to the metals that Jack Flipse talked about, we built our society on those metals. All of them are absolutely essential for continuing our present standard of living. Jack Flipse told you there is no metal shortage. We do have a bit of an energy problem, but we do not have a metal shortage. Let's look, for example, at one of the component metals of manganese nodules--nickel. Jack Flipse told you that we import 75 percent of the nickel that we consume. I might mention that 65 percent of that 75 percent comes from Canada, costing $354 million a year. We estimate that one manganese nodule mine, such as the one Jack Flipse contemplates, which will produce 1 million tons of nodules, not metals--nodules, a year from a single mine site, would reduce our imports of nickel by 11 percent. Other companies are thinking of larger production--some are thinking of 3 million tons a year. Now, 3 million tons a year would supply us with a third of the nickel we now import. In short, this represents a hundred-million-dollar contribution to our balance-of-payments problem from a single manganese nodule mine site, and then from only one of the metals contained in manganese nodules. That is not an all-controlling factor in this negotiation, but it is an important one. Let me give you an example of how important our resources are to us. There has been substantial criticism of the United States position. You have just heard from Jack Flipse that perhaps we are willing to trade some of our resource interests in this negotiation. But we aren't willing to do so and I think that it would be worthwhile for me to give you some indication of how strongly we feel.

Just a few weeks ago the House Merchant Marine and Fisheries Committee held a hearing on the Law of the Sea, and in that hearing Jack Stevenson was asked what the United States considers nonnegotiable. The question went like this, "Are there any particular positions of the United States which we have clearly defined in the Seabed Committee as one which we will not deviate from at all so that the rest of the countries involved at least know that the United States will not ratify any convention which does not include certain specific provisions?" Mr. Stevenson responded, "We have indicated that our navigational interests in freedom of

navigation, overflight beyond 12 miles and transit through straits must be accommodated." The counsel for the Committee said, "In some form or another?" Mr. Stevenson said, "Yes. We have also, as I pointed out this morning, this summer indicated that we have basic economic interests that must be accommodated, in that, for example, we couldn't accept the concept of monopoly by the international organization of the deep seabed exploitation."

Mr. Stevenson also said on August 10 in a widely quoted speech to the U.N. Seabed Committee the following: "Some Delegations appear to have the impression that maritime countries and the United States in particular can be expected to sacrifice in these negotiations basic elements of their national policy on resources. This is not true. The reality is that every nation represented here has basic interests in both resource and non-resource uses that require accommodation." Now please note that I have said these are our national resource interests. It happens occasionally that our national resource interests coincide with some of the things that our industry wants to do. I wouldn't go so far as to say that what is good for the industry is good for the United States, but development of oil, development of the metal contained in manganese nodules is in our national interest.

What do the developing countries think about resources? If we think they are so important, the developing countries surely think they are important. From what we have seen, the developing countries fully appreciate the importance of control over resources. You heard this morning of the Organization of the Petroleum Exporting Countries which has been controlling petroleum prices. There is a similar organization for copper. The developing countries are very well aware that a source of power in this world is their ownership of resources and our need to use those resources in order to survive as a technologically advanced country. And it is that awareness which brought about the "common heritage of mankind." It sounds like a very lofty ideal; it's not. The common heritage of mankind is a euphemism. We accepted the common heritage; we put it into the draft seabeds treaty tabled by the United Nations; and we had an understanding of it. Other countries have a very different understanding of it. The common heritage of mankind means to most of the countries who ardently support it control over resources in order to change the power structure in the world. For them it may not be a bad thing to do. In fact, that may be a noble objective in itself. But for the time being it doesn't appear to be in our national interests to support that idea. We do support the common heritage of mankind in this sense--we've said that the common heritage of mankind shall have the meaning ascribed to it in an international treaty to be negotiated. That is, the sum of all the articles of that treaty will tell us what common heritage means. We do not accept the notion, and we have explicitly rejected the notion, that common heritage of mankind means common property of mankind. Indeed, the Chairman of the working group which is negotiating the treaty, Chris Pinto

from Ceylon, said in his own view this past summer in Geneva that common heritage did not mean common property. That is a particularly significant statement from a particularly significant man in these negotiations.

It might pay us to take a moment to review the present law. You all know we are negotiating a treaty, and some people may wonder why. Let's look at how the present law protects the interests you've heard about today. With respect to the continental shelf, our own continental shelf, and the continental shelves around the world, the Geneva Convention on the Continental Shelf allows the coastal state the sovereign right to explore and exploit the resources out to a point where the water becomes 200 meters deep or beyond that point to where the depth of the water admits of exploitation. The area in question, not only the continental shelf, but eventually the continental slope and rise, will one day be exploitable. That area under the treaty's provisions must be adjacent to the coast. Nobody knows what "adjacent" means, although the most popular view of adjacency is that the Continental Shelf Convention could not take you into the deep ocean floor. It could not take you out beyond the boundary between the continental margin and the deep ocean floor. I think that our petroleum industry accepts that definition of the Continental Shelf Convention. The U.S. Government does not. We take no position whatever on where the ultimate end of the continental shelf would be, if exploitability enabled us to go into very, very deep water.

So under the Continental Shelf Convention, oil lying off our coasts is available. In addition, oil around the world on the continental shelf is available to us when our oil companies negotiate arrangements with foreign countries to exploit that oil. Those foreign countries can impose any condition they see fit on oil production from a continental shelf. On the deep seabed, the area where the manganese nodules are found, the High Seas Convention applies. Not all countries agree, however. It is our position that the Geneva Convention on the High Seas permits the mining of manganese nodules today. There is no reason in the world in the view of the U.S. Government why Jack Flipse cannot go out and mine manganese nodules in any reasonable quantity he sees fit tomorrow. If he has the technology and he's ready to go, he's free to go. The U.S. Government would take no action to prevent him from doing so. That being the case, you might wonder why we need a Law of the Sea treaty, particularly to protect these interests. Well, Jack Flipse has explained to you the position of his company, and to some extent--to a large extent--has reflected the views of his industry. I think the most succinct statement of why the hard minerals industry would like to have a treaty is contained in a statement made by the Vice-President of Kennecott for Exploration, Mr. Harry Burgess, before the Senate Interior Committee. He was testifying on behalf of S. 2801. I'll read you what he said because I think it is an excellent summary of the industry's position.

> The basic hard mineral issue has been obfuscated by the rhetoric of the UN Seabeds Committee and by the preoccupation of our Government with other legitimate law of the sea goals. However, the issue can be stated succinctly as follows. U.S. ocean technology has advanced at a rapid rate and industry is now on the threshold of initiating exploitation of vital natural resources in the deep ocean. Industry is frustrated by its inability to protect itself against the political risks involved and by the slowness of the Executive Branch of the U.S. Government in mitigating these risks. Other nations see our progress toward tapping this resource potential as a threat to their own desires to dominate mineral markets or as a U.S. advantage in achieving a natural resources position which must at least be retarded, or as an opportunity to frustrate our vigor in a vital area. In summary, it appears clear to us that the need is urgent for commercial production of hard minerals from the deep seabed to supplement supplies from land sources. The metals which could be recovered from the manganese nodules are essential to the U.S. economy and are not produced in this country in amounts adequate to supply the requirements. Technology in the field has made important strides and may be ready to support commercialization by 1975 or 1976. Before committing large sums--$150 to $300 million dollars for a commercial plan, it will be necessary for a private U.S. entrepreneur to have certain assurances of a legal regime. That regime is needed forthwith. An international regime is years away. We urge the passage of S.2801 lest the nation lose ground in this technically innovated ocean development area. Otherwise the lead and benefits may pass to others whose governments are providing direct support while the U.N. debates. We would lose early opportunities to secure important raw material sources with implications with respect to balance of payments, national defense and the national economy. A lead once lost is not easily regained if it can be won back at all. The process is underway now and immediate governmental action on this legislation is essential if the United States is to realize its opportunities in this important new field.

I would simply delete the reference to S.2801 and refer to international negotiations instead, and then the statement makes a good deal of sense. Now, what does the United States propose? We have a very, very complex treaty proposal on the table before the U.N. Seabeds Committee. I'm not going to summarize it today. I would simply mention some of its principal features. It provides for revenue-sharing with the developing countries. It provides for technical assistance for the developing countries so that they can develop their own expertise in deep ocean mining and in deep ocean technology generally. It provides in some respects for technology transfer. It provides for compulsory dispute settlement. The U.S. draft seabeds treaty was a significant achievement for the United States, particularly for its bureaucrats. The drafting was done largely in response to what the developing countries said they needed from the Law of the Sea Conference. However, the developing

countries have changed the name of this game very substantially since the negotiation began and it is one of the reasons that Jack Flipse is so frightened.

Let me give you an example. In 1969, only 3 years ago, while the U.N. Seabeds Committee was debating the report of one of its subcommittees, the Soviet Union proposed that under the question of what should be the powers and functions of the international organization to be established, the report of the Secretary General of the United Nations on that subject be referred to member states for study. That proposal was put forth as, "It was suggested by some Delegations that," simply to be included in the report of what had taken place in that subcommittee. It was vigorously opposed. One representative of a country it seems pointless to name went so far as to suggest that unless the Soviet proposal were amended it should be withdrawn. Eventually, after a good deal of acrimonious debate, the Soviet Union and several other countries were asked to step out in the corridor and come back with a compromise formulation that could be put into the report. When they returned, it was agreed that the Soviet Delegation would not press for inclusion of its views in the report but wanted it noted that the paragraph where this issue came up was not fully supported by all Delegations.

Now, I mention that for several reasons. First, it indicates what it's like to negotiate in the U.N. Seabeds Committee. You can't always express your view, even when you label it as your own view. We made a proposal last summer and agreed on the floor of the United Nations to have it put in as, "The United States Delegation said," and it was disagreed with. That's one problem. The other problem is the one I referred to just before telling you that story. That is, the name of the game is changing. The reason there was so much opposition to the Soviet proposal at that time was that neither the United States nor the Soviet Union in 1969 had accepted the principle that there would be international machinery to govern deep seabed exploitation. The developing countries at that time were stating that their maximum objective was simply an international organization that would have functions with respect to resource exploitation. Today, the United States has agreed to a very substantial international organization with significant functions regarding resource exploitation on the deep seabed. The same developing countries now support an international organization with the exclusive right to mine manganese nodules and whatever other minerals are found in the deep seabed, engaging U.S., Japanese, and German companies in what we call service contracts. But they will own the resource and they will market it. Also, as Jack Flipse pointed out, there are several developing countries who want to assure that when that resource is marketed, it is at certain prices or not marketed at all. By the way, this does not protect most countries in the world, including most developing countries. It's the view held by a few countries who are highly dependent on the extraction of certain minerals in their own economy. It's not widely held, but it's also not a widely opposed view; that's another reason Jack Flipse is frightened of these negotiations.

So the developing countries have set out the guidelines for this negotiation--guidelines that demand increasing concessions from the developed countries. Now, that presents us with a terrible dilemma. The dilemma is, why stay in a Law of the Sea Conference when we are being pushed dangerously close to negotiating a treaty that our Senate may not ratify? I think the answer to that was contained in the first five minutes of Jack Stevenson's remarks yesterday. There is one overriding policy objective in these negotiations which the United States has probably not stated very clearly and that is to help stabilize the world and reduce the potential for conflict. In part, that is a selfish objective, for countries like ours do better in a stable world. As a matter of deliberate policy, the United States is best served by a world that resolves its conflicts peaceably. On the other hand, conflict avoidance is probably more important to the developing countries than it is to us. The reason for that is ugly but simple: In most conflicts we'll win.

It's almost terrifying to consider what we would have to do to protect the interests of American tuna vessels off the coast of South America if the Law of the Sea Conference fails. Assuming the tuna industry continued to have its vessels seized off the West Coast of Latin America, we would no longer have the option of going to Congress and saying, "Senator, there's a Law of the Sea Conference in progress. We're going to resolve this question and it will be over soon." This is it. This *is* the negotiation and if it fails, I wouldn't like to predict how the victims of unilateral coastal state claims and demands will react from time to time. I wonder, over a long period of years, as we become increasingly dependent on petroleum if we can afford as a nation to simply put up with the kinds of problems the tuna industry has been facing for a good many unhappy years off the West Coast of Latin America.

The United States has agreed to make substantial concessions at this Law of the Sea Conference in order to avoid our or any other country's being put in that awful position. But we're not really making the kind of progress we ought to be making to solve these issues on a timely basis. How long do we tell Jack Flipse to wait? How long is it justifiable to ask him to wait? Five years? Seven years? One year? He's ready now, and fears that we're going to negotiate away the very rights upon which he would base his investment.

Now, we have urged the developing countries to settle the Law of the Sea once and for all, and very promptly. They're not about to do that. We originally set 1973 as a date for the Law of the Sea Conference. Now, everybody is talking about 1974, and not everybody is talking about finishing in 1974. After the treaty is negotiated and after the treaty is signed, how long will it be before it really comes into force? A treaty covering all of these issues has to be ratified by most countries of the world in order to be effective. How many years will that take? And will we tell Jack Flipse to wait all those years? I think the answer is yes, we will tell him to wait all those years if something very extraordinary

can be seen coming out of the Law of the Sea Conference. Ambassador Pardo proposed some very extraordinary things the other night. He proposed them several years ago. I think you'd find something very extraordinary in the U.S. position and draft treaty of 1970. But those days are passing. The United States is being forced to negotiate down to the least common denominator in this negotiation. And it's not at all clear that we're going to get anything out of it of any significance, including conflict-avoidance.

The Department of Defense is concerned about the progress of this negotiation. They've asked for something fairly simple and you heard Jack Stevenson describe it--free transit through and over international straits subject to reasonable coastal state controls with respect to pollution hazards and navigational safety. They don't see any signs of getting it. The hard minerals industry would like to have a deep seabeds regime. Jack Flipse gave you the reasons for that--it's a long-term stable situation, basically good for the industry. He's not confident that we can negotiate such a regime. The petroleum industry and the U.S. Government would like to see that in the broad continental margin area there are internationally agreed standards to protect against pollution, to protect other uses of the area from interference by the coastal state, and to protect the integrity of investment. We don't see that in the near future. Most of the fisheries industry would be just as happy with a unilateral claim by the United States to 200 miles of exclusive jurisdiction.

So every one of the interests, or almost every one of the interests on whose behalf the United States is negotiating, might do just as well without a Law of the Sea treaty. It's not a big calamity for the United States, except on the issue of world peace. We may not be able to obtain a treaty that will give us some assurance of a stable world order. By the way, critical to this issue is compulsory dispute settlement. Maybe the greatest achievement that can come out of the Law of the Sea Conference would be mankind's willingness to abide by a tribunal's decisions. If we could get that, it would be valuable. But if we couldn't, and there was nothing else of value in a Law of the Sea treaty, would it have been worth asking Jack Flipse to wait? Those are hard questions to answer, but I believe it would be irresponsible to disregard the $300 million dollars which he and others of the industry want to invest to harvest a resource which as a nation we can use.

By the same token, we must begin to see some progress in these negotiations if we are going to achieve some of the truly lofty aims that we're capable of achieving. Jack Flipse may not get precisely the kind of regime he wants on the deep seabed. Our fisheries industry may not get what it wants. Nobody ever does in a negotiation. But if we can stabilize ocean

use, if we can use the resource area of the oceans as a model for some sensible, intelligent decision-making for an international organization that works well and efficiently, and a tribunal that decides disputes based on expertise and not politics, we will have achieved a great thing and our commercial interests are not as important as that great thing. But the developing countries have to show some signs that this is their overriding policy objective also.

Until the Law of the Sea Conference stops talking about selfish parochial interests and starts worrying about man's last opportunity to do something sensible with two-thirds of the earth's surface, it's going to become increasingly difficult to tell Jack Flipse to wait.

OIL AND HARD MINERALS

Pollution Problems

Joel W. Hedgpeth
Resident Director
Marine Science Center
Oregon State University
Newport, Oregon

During the last 2 days we have heard from several special interest groups, and appropriately so. However, the special interest of the ecologist was not often mentioned. This special interest is based on the knowledge that everything in the world is interrelated and that what is done to the environment in one place may affect the world in some other place. It is a rather simple point of view, but difficult for some people to understand. Often we encounter such remarks as "When it comes to a choice between ecology and people, or between ecology and progress, ecology will have to go." But ecology is not a fashion or quasi-religious movement, it is simply our word for the study of natural processes, and by extension, for the processes themselves. The special interest of ecologists is really for the survival of this natural system as the basis on which human life depends. Thus our interest is really in the future of mankind and whether mankind will survive. In some minds, of course, there is some thought that perhaps man may not deserve to survive as a species, and often his treatment of the environment would suggest that his tenure is dubious.

Pollution has always been with us, so we are told, and therefore what are we worrying about? Not only is pollution part of nature, but the natural scale of disasters is much greater than that of man-made catastrophes. So we have heard, from people like Glenn T. Seaborg. People who express this attitude are primarily physical scientists, conditioned in terms of thinking down the scale to the relative insignificance of very small events, and overlooking the almost opposite action of biological processes capable of exponential increase. Man himself has now become such an exponential force, and his activities have the potential of causing such major catastrophes as the eruption of Krakatoa.

Some idea of the rate of our potential to disturb our environment may be gained from the events of the decade 1935-1945. During this decade we introduced four new kinds of pollution, and all of them were turned loose in the environment before we fully realized what their potential was and what they could really do to living systems. DDT was synthesized in 1872, practically 100 years ago, but its capacity as a killer of insects was not realized until 1939. At that time we did not fully understand some of the enzyme systems in nature. I don't think the workings of the carbonic anhydrase system were fully understood until about 1939, but that's what keeps the pelicans from producing good hard egg shells. At any rate, in the 1940's we began to synthesize these pesticides and turned the whole family of them loose.

In 1937 the first sulfa drug was used and we began to develop all kinds of antibiotics. This has had two effects. By saving many lives it has changed the age structure of our population, but because of the potency of many of these substances, we are selecting out resistant and powerful strains of viruses and other microorganisms. The tendency to select out much more resistant strains is a significant and unanticipated effect. Widespread use of these materials is obviously dangerous to us because we increase the strength of our enemies.

In the 1940's we developed atomic energy--first as a bomb, then as a fuel for power development. We tend to forget the hidden cost of producing this nuclear fuel--the vast amounts of fossil fuel and water power needed to generate the electricity to make nuclear fuel. But that's another story. It is consuming an awful lot of standard power.

They tell us that right around the bend they will develop fusion power and all will be well for our energy needs. But we will still have the problem of handling radioactive wastes generated by the operation of nuclear power plants. Some of these wastes will be around, potentially dangerous, for thousands of years. At least we have reached an international consensus against dropping this material into the oceans, although it has become a widespread practice to dispose of low level wastes by leaching them into the sea.

Another great problem associated with atomic energy--and all sorts of power generation--is the surplus heat developed during the generating process. Effluent heat has reached such magnitude, requiring such large volumes of water for cooling, that it seems the seashore is the only good source of water. Inland plants in the United States are already requiring a substantial fraction of all freshwater from streams and lakes, and there is a general shift to cooling towers.

The fourth thing we produced in this amazing decade is detergents. It did not take us long to find out what dumping these into our environment was doing to our ground water, and we have shifted over to soft or degradable detergents. So here were four completely new things in the environment,

and as far as radioactivity is concerned, we have added new isotopes or abundances not occurring naturally. So we unleashed the four horsemen of the ecological apocalypse.

In a recent book, Garret Hardin (1972) restates his famous essay, *The Tragedy of the Commons*, and points out that the oceans are such a commons that everyone owns, with the result that nobody owns them. It might be said that the things said during the last day and a half of this meeting indicate quite otherwise, but one fails to note very much concern about the long-term continuity of fisheries stocks. A lot was said about maximum yield, and at least once, I think, optimum was equated with maximum. But we do not know what "optimum" really is except that it is probably less than "maximum." Lately I have also heard the term "acceptable biomass," but the exact meaning or intention of this escapes me.

Hardin suggests two solutions for this problem: either you build fences so you can protect your own domains, or you socialize the oceans. It's either that or the ultimate destruction of all fisheries stocks. I get the impression that most of the international regulations and commissions discussed here and at other meetings will not have many teeth; in fact, it doesn't sound as if they will even have jaws. Also, air and water are parts of the commons. Here we must remember that what happens in the air will affect the oceans. What is dumped on the fields of the Ukraine, Kazakhstan, or Kansas gets into the aerosol system and falls upon the ocean. Perhaps it was from one of those places that the DDT detected in Antarctic penguins got into the system. So the whole aerosol system has to be taken into consideration, since what man does in the interior parts of the continents affects the ocean. So, as far as pollution is concerned, a Law of the Sea is not enough; the environment is too interrelated.

We hear a great deal about "external costs" these days, especially in the matter of pollution. If you can dump wastes into the environment, it is a convenient way of hiding the real costs of the operation. The air and ocean in this context are the great externalizers; without the free use of the commons of the air and the oceans, the cost would be very high. If all costs were out in the open and pollution paid for, the prices of many things would be high indeed. In this respect, as Hardin points out, capitalism and communism are identical. We say the board of directors won't stand for the expense of handling waste materials; the Communists say the central committee will object. The end result is the same: pollution.

All sorts of statistics could be presented about the pollution of the oceans, but a few will convey some sense of the magnitude of the problem. There is something in the order of 320,000 metric tons of lead per year released into the atmosphere and much of this gets into the ocean. The natural plant flux, interestingly enough, is of the same magnitude--this consists of the natural substances transpired by plants into the atmosphere and much of this becomes part of the natural cycles in the ocean. Something like 10 million metric

tons of crude oil per year will be spilled, leaked, or seeped into the ocean by 1980. The deliberate cleaning of vessels is a minor part of this. The natural seepage is now about 1 percent of the total oil added to the ocean.

In this context it must be said most emphatically that the famous and often cited report of the effects of the Santa Barbara oil spill is ecologically worthless. It does not prove that there was no damage or effect, just that no noticeably serious aftereffects were observed. It has been taken up and overemphasized. Like all such ad hoc studies, it is a difficult matter to prove anything, and the report cannot be used as justification for continued oil spillage. Unfortunately, it has lulled a lot of industrial interests to assume that "oil is not going to harm anything." An example of that sort of information concerns fish. A lot of fish were found in the area after the oil had cleared up, but it cannot be assumed that this occurrence has any relation to the oil. There is no information to indicate the fish may not have moved in afterward as part of a regular seasonal pattern that only coincidentally occurred after the oil spill. This particular report is full of such inadequate information. A good critique of it will be found in a book by Wesley Marx, *Oilspill* (1971).

Let's return to other frightening statistics: the solid wastes, for example, now being dumped into the New York Bight exceed the total sediment load of all the streams of New England and the North Atlantic seaboard. In other words, man has become a major sedimentary influence. We dumped something like 48 million tons of irreducible crude slag, chunks of buildings, ashes, etc. into the oceans in 1968. At this rate Troy would have been buried in decades instead of centuries. That might be a good thing for New York. Of course, it must be remembered that some inorganic chemicals would be very quickly neutralized if we dumped them into the open sea.

Our concern for the environment has caused us to attempt to dispose of some things on land at the expense of space when they might have been taken out to sea without causing much damage. But that applies to certain chemicals on the high seas. What we are really concerned about is what we are doing to the shallow seas and the surface layers all over the world ocean. There are differences in the oceans because of the differences in productivity and action at the active surface layer especially in near-shore regions. In part, this productivity reflects the intensity of natural fallout. There has always been higher productivity in certain parts of the world ocean and this indicates where substances may be naturally concentrated. DDT, for example, enters the system through the natural lipid slicks of the surface layer and is more dangerous in a rich, active system like that of the California coast or the Antarctic.

One of the uneasy things about much of our pollution is that we do not know much about the effects of many of the substances we have already released into our environment. Perhaps we have already killed the ocean, although I don't wish to think so. I cannot quite agree with Captain Cousteau and

prefer to agree more with the temperate discussions of Wesley Marx in *The Frail Ocean* (1967) and Moorcraft in *Must the Seas Die?* (1972), although I find the conclusion is a bit weak. The temptation to dump things into the ocean is irresistible and one of our most eminent sanitary engineers declared that "dilution in the ocean is the only thing we have going for us." The better known version of this attitude is "the solution to pollution is dilution." This is based on the strictly mechanical approach: there are 350 million cubic miles of ocean water which should absorb and dissolve everything. Perhaps this would be possible if there were enough external mixing force, but that large a spoon does not exist. However, the nearshore systems are physically somewhat separated from the high seas system of the open ocean and deeper waters so there is a lag, and a tendency for waters to circulate within certain boundaries rather than diffuse evenly. In emphasizing the diluting power of the sea, the last holdouts for the concept of the inexhaustible sea are in fact the engineers. Most fishermen now say, whether they completely believe it or not, that the sea is indeed exhaustible; we can indeed deplete stocks.

An interesting approach to this problem of the limits of production in the sea was made by Wolf Vishniac, who estimated the potential basic production of microorganisms from the actual amount of light energy available (*see* Hottle, 1971). He found that the present world fisheries catch is about one-fifth the maximum productivity. Or, one could say that we can only expand our take from the sea by five times, and that would be straining this system of the ocean. In this context, another factor must be considered: the effect of pollution on the carrying capacity of the earth. For example, Soviet works have claimed that addition of radioactivity to the sea at near background levels will cause mortality of eggs and embryos of sardine-like fishes in the Black Sea. Our people have stated they do not understand these data (*see* Hedgpeth, 1972*a* for discussion), but the fact does remain that relatively minor environmental changes may have a disproportionate effect on such heavily exploited stocks as sardine or anchovies. We are reaching a position where we are taking more and more from the sea, and a relatively small amount of pollution may have a much greater effect on these populations under stress. This is another indication of our potential to affect the nature around us, of our capacity as a major ecological force.

At the same time we take millions of tons of substance from the sea, we put almost nothing back. Indeed some of our water boards want us to return almost pure water to the sea, a wasteful process since if we are going to purify that much water we should be reusing it. And this deprives the oceanic system of useful chemicals. We are not making any serious effort to recycle all this substance being removed from the ocean. Perhaps we should be dumping sewage into the sea. The Dutch fisheries biologist, Pieter Korringa, has remarked that we should dump all the livestock manure of Holland into the North Sea (Korringa, 1972). Of course there may be a mess around the outfalls, but nothing really gets back into the anchovy system off Peru.

The problem of hot water is strictly local at this time, but there is talk of building so many reactors or power plants that you could warm up the water off Oregon so it would be pleasant for swimming. In a somewhat speculative article Weinberg and Hammond (1970) estimate that we have the potential to supply all the power demands of 20 billion people at our present level of use with 4,000 massive power plants along the shore. In a nearshore situation the water cycled through such a system of plants could amount to a significant fraction of the total water volume and the magnitude of operation could have a considerable effect on the natural regime (*see* Hedgpeth, 1972*b*). Of course it is stated that warming up the ocean will improve production. This is based on the idea that marine life is more productive, or at least turns over at a higher rate, in tropical waters, so therefore moving the tropics into temperate regions would improve things. But this may not be so. For one thing, life in tropical waters is much more narrowly adapted to environmental change, and lives near the upper level of temperature tolerance. Further, it is not clearly understood that on temperate coasts the ranges of the organisms involved are adjusted to seasonal and daily variations in temperature and that stabilizing the temperature regime would dampen these variations and accordingly reduce productivity.

As for the use of cooling water by a large power plant, the plant might be considered in that context a stationary predator. Thus the cost of the plant might be estimated by considering the percentage of fish sucked into the cooling system in the total volume of a reasonable area near the intake and writing them off as lost. For some reason this seems to be more disturbing than an inadequate estimate of the percentage of loss of the fishes actually going through the system. At one point in our concern for the effects of warm water (or pollution in general) such a broad statement of what constituted a significant species was drawn up that it included, by inference, every possible species in the ecosystem--or perhaps the world, for that matter.

But the basic lesson of ecology is that all things are interrelated. Al Pruter said that we have to do three things if we wish to increase the productivity of the seas: (1) manage our fisheries stocks, (2) utilize smaller components of the food chain, and (3) remove artificial institutional restraints. To these I would add a fourth requirement: control or rather cessation of massive pollution, especially in the environment of heavily exploited stocks. But in legislation and regulation of these matters some of our domestic agencies are in danger of becoming overspecific in asking for a currently fashionable protocol or statistical procedure in environmental impact investigations. This has to be avoided also.

The final question is not how long can we continue to develop or increase our technology, but how much of it can we continue without destroying our planet as a biotype? Another way of stating this is that we must recognize that the earth--and the seas which are a part thereof, has its limits, it

has a carrying capacity. What sort of creatures are we to think we must use up as much of the world's resources as possible in our own generation? How far, then, can we go with this ever-increasing technology and its demand upon resources and resultant extravagant feedback of deleterious substances before we interfere with the carrying capacity of our life support system?

This is what the doomsday people are not so much asking as telling us. Paul Ehrlich has said from several pulpits that we have about 20 years; I prefer to think in terms of a couple of centuries and take some encouragement in the prediction that we will run out of oil in perhaps 75 years. My hope is that perhaps the human species can survive this technological binge and after 75 or a hundred years when we have used up everything, we can adjust ourselves to a less extravagent way of life. A lot of us may die off like rabbits or lemmings in the readjustment process, but hopefully there will be enough left to start off a less exploitive world. Of course, a more pessimistic view is exemplified by the cartoon of the two monkeys, one of whom is handing the other an apple to which the retort is, "Let's not start all that over again."

But the real question, which we should bear always in mind is, how far can technology go before it destroys our environment?

REFERENCES

Hardin, Garrett. 1972. Exploring new ethics for survival. The voyage of the spaceship *Beagle*. The Viking Press, New York. xiv + 273 pp.

Hedgpeth, Joel W. 1972*a*. Atomic waste disposal in the sea: An ecological dilemma? Pages 812-828 *in* M. Taghi Farvar and John P. Milton, eds. The careless technology, ecology and international development. The Natural History Press, Garden City, New York.

Hedgpeth, Joel W. 1972*b*. A little matter of calefaction. Pages 113-127 *in* Wesley E. Brittin, Ronald West, and Robert Williams, eds. Air and water pollution. Colorado Associated University Press, Boulder.

Hottle, G. A. 1971. Is the ocean an inexhaustible source of food for mankind? European Scientific Notes, ONR, London. 25(6):188-189.

Korringa, Pieter. 1972. Newspaper interview, reported by Pat Perry. San Rafael, California. Independent Journal, July 25, 1972.

Marx, Wesley. 1967. The frail ocean. Coward-McCann, New York. viii + 248 pp.

Marx, Wesley. 1971. Oilspill. Sierra Club, San Francisco. 139 pp.

Moorcraft, Colin. 1972. Must the seas die? Temple Smith, London. 219 pp.

Weinberg, Alvin, and R. Philip Hammond. 1970. Limits to the use of energy. Amer. Sci. 58:412-418.

OIL AND HARD MINERALS

Scientific Research Issues

Michael Waldichuk
Program Head
Pacific Environment Institute
West Vancouver, B. C.

The principles of conducting scientific research on the high seas without interference from nations or international control by bodies is dear to every marine scientist's heart. Ideally, of course, every oceanographer would like to be able to go anywhere at any time and do anything that he might feel needs to be done in order to carry out a particular experiment to verify some hypothesis that he has developed. Unfortunately, this is not always possible within a particular nation's boundaries, let alone internationally where you are dealing with other states. Although scientists are generally responsible people, there are a few scientists, as there are individuals in other segments of society, who need some restraint in order that they do not violate certain principles which affect other people's lives, safety, amenities, and pleasures. Certain restraints are needed on scientists in the best of laboratories so that costs are maintained within reasonable proportions, equipment and facilities are used effectively without abuse, the health of individuals in the laboratory or in the environment is not threatened, and environmental damage is not sustained. On a much broader scale, international control of research on the high seas would have to take some of these matters into cosnsideration, so that the states' rights in preservation of their coastal environment and their aquatic resources are not violated.

It is a maxim which every scientist and every nation wishes to preserve that states have a right to conduct marine research on the oceans. It is on the basis of this right that nations would like to develop an acceptable scheme for maintaining marine research on the high seas and in coastal waters so that processes can be better understood, the resources of the sea can be better explored, and knowledge needed for the preservation of the marine environment can be more fully available for the benefit of all mankind.

The Intergovernmental Oceanographic Commission at its sixth Session in Paris, France, in September 1969, reviewed the rights of states to carry out fundamental research in the marine environment and prepared a resolution on this subject. It was one of the more difficult issues to resolve and to reach an agreement between the developing and developed nations. There is always a suspicion on the part of the developing nations that the industrially advanced nations are merely trying to find ways of exploiting the waters and the resources of the water and the seabed in areas adjacent to the developing countries. When resolution 6-13 entitled "Promoting Fundamental Scientific Research" was finally accepted by consensus at the General Assembly of the Sixth Session of IOC, there was an audible sigh of relief from many quarters, indicating the difficulty under which the members of the particular working group drafting this resolution worked. It was only because of the skillful handling of the working group by a female jurist from the Netherlands that this resolution was finally formulated and was accepted. There were long and heated debates between the representatives from the Latin American countries and from the more advanced countries of western Europe and the United States. In its concluding statements, this resolution "invites interested member states to act in a spirit of international cooperation, to consider favorably and to facilitate within the framework of national laws and regulations, the requests for vessels conducting fundamental scientific research to make ports of call."

In Canada and the United States by informal local agreement, we have been able to conduct research in each other's waters with a minimum of interference. Scientists at the University of Washington have been interested in the low dissolved oxygen layers of some of the British Columbia inlets. They wish to conduct research in these outlets to understand more fully how they behave under various conditions and what makes them the way they are. If we were to impose strict controls on their work, this type of research would not be possible and we would all lose in the end because knowledge would not be forthcoming. On the other hand, we are interested in knowing more about the movements of coastal waters as they relate to salmon in the Northeast Pacific, and we may extend our stations to the coasts of Washington and Oregon. This has always been possible with a minimum of "red tape," and programs have generally proceeded without interference from national authorities, with the ports always open in the case of any unanticipated events such

as illnes or severe storms. Scientists on both sides of the border rather jealously guard these arrangements which could be jeopardized by any kind of international law where a strict protocol had to be adhered to in clearance for oceanographic work by one nation in the waters of another.

BASIS FOR CONTROL OF INTERNATIONAL MARINE RESEARCH

There are two basic reasons why coastal states feel that there should be some control imposed on scientific research in the marine environment: (1) national security and (2) protection of marine resources. It has been commonplace to hear comments from many people, including scientists that Japanese and Russian fishermen are out on the fishing banks along the coast of the United States and Canada, collecting not just fisheries information, but certain types of information of value to people in defense. Whether this is true or not is beside the point, but the fact remains that every nation wishes to guard certain areas of its coastline against possible aggression. Developing countries are always concerned about the "imperial powers" grabbing resources along their coast and providing little or no compensation for these. There is a certain amount of proprietary information that does not become public when collected by certain exploration companies for oil and other minerals. This becomes a matter of competition within the free enterprise system where a company paying for certain exploration and research does not wish to have a competitor take advantage of such information without paying for it.

Although the chances for degradation of the environment through research are somewhat small, nevertheless there must be some restraint on scientific research and exploration to make certain that environments and resources of a given state are not disturbed to the point where there may be irreversible damage. It is conceivable, for example, that for a particular experiment it would be desirable to use a long-lived radioisotope as a tracer. Without some control, scientists may ignore the possible effects that these may have on the food resources of the particular region which are taken by the adjacent state. Such a proposal would certainly require the assurance by the planners that it would have no harm on the resources of the state. Another example might be artificial perturbation of a system to provide some aspect of environmental modifications for a study of such effects on an ecosystem. While such an experiment may be relatively innocuous in a small area, it could do a great deal of damage in larger bodies of water. Extensive sampling for statistical purposes of a particular resource might be damaging to that resource. It might be desirable for a population dynamics study to nearly eliminate a particular species in a given area. Some control has to be maintained over such operations to prevent irreversible damage.

There is a concern in the scientific community that the controls, however, could be so restrictive as to prevent scientific research along the shores of coastal states. The extent of national jurisdiction declared by certain coastal states could be such as to encroach on large areas of the ocean where scientists may wish to work. It is hoped that the Law of the Sea Conference will recognize the right of nations to carry out scientific research in the marine environment, and while imposing certain nominal controls on such research, it will in general declare the freedom of the seas to such endeavors. Scientists have ruefully commented that merchant ships will have the right of innocent passage anywhere, warships will have freedom of movement on the high seas, but research ships will be controlled everywhere.

OBLIGATIONS TO COASTAL STATES FROM FOREIGN RESEARCHERS IN ITS WATERS

A nation which undertakes to do research in the waters of another coastal state has certain obligations to that state. It should inform the coastal state sufficiently well in advance of its proposed cruise program on the type of research it proposes to conduct, the types of ships that will be in the area, the size of crew, the name of the captain of the ship(s), and whether there will be space available for scientists of the particular coastal state to participate in the program. If there are any ports of call to be made, these should be so designated with time and duration clearly stated. These ships and crew should abide by the laws of the coastal state and should make every effort to avoid misdemeanors of any kind while in port, or infractions of the rules of the road while at sea. There should be as little damage as possible to the aquatic environment or to the bottom, in any kind of experimental work. The foreign investigators have an obligation to the coastal state to make available to the appropriate agency, data and samples that may be collected in its waters. Early publication of the results is encouraged and the coastal state should be on the mailing list for the data as they become available, either in processed form as data records or as interpretive publications. Information, particularly on exploitable resources, should be made available to the coastal state.

We know that in local situations where we have collaboration between Canadian and American scientists, for example, oceanographic data can be freely exchanged and publications involving the data are usually available soon after the cruises. There have been times, of course, when certain data were taken by defense-oriented scientists and classified. We have had situations where data records with the mark "Restricted" have been misinterpreted as being classified for defense purposes, whereas it was only meant to indicate that the distribution was restricted. Although we have had a number of expeditions in support of the Defense Research Establishment Pacific in Esquimalt for collection of salinity and temperature data, in programs of acoustic

measurement under the sea, the actual data collected were not of a classified nature, although their use for defense purposes, particularly in antisubmarine warface, would very well be.

We seldom insist that a scientist be on board an American ship when it is working in our waters, although sometimes the scientist may be particularly interested in a program and will accompany an expedition. As a courtesy, the American cruises into our coastal waters usually make available space on board for Canadian scientists who may wish to participate. We try to do likewise, if it happens that we are working in American waters, or if we know that a particular field program is of interest to American scientists. It sometimes leads to a more complete program if we can get participation of scientists having different interests from both Canadian and American agencies.

OBLIGATIONS OF A COASTAL STATE TO FOREIGN INVESTIGATORS

It is considered an obligation on the part of the coastal state to respond as early as possible to any application being made to carry out research in its waters by another state. If the planned cruise program abides by the schedule that is presented, the coastal state is obliged to allow the ships and crews into ports designated, so that the essential fueling and victualling can be carried out. While the coastal state expects the foreign investigators to abide by its laws, it is also obligated to provide protection to the visiting scientists against any piracy or marauding nationals. In the event of some exigency, requiring unexpected entry into port outside of the original plan, the coastal state is obligated to give prompt consideration, and to make available requested facilities, provided that the visiting scientists make the necessary application by radio before entering port. There are critical emergencies, such as sickness, which may demand very quick action in order to save human life. These may be exceptions to the rule of advance authorization for cruise plans, and all efforts should be made to clear entry into port for such emergencies.

In the event that a cruise plan has been changed during the course of an operation, for one reason or another, the change in plan should be conveyed to the authorities of the host nation as early as possible. Approval of the change in plans should be given as soon as feasible, without unreasonable delay to jeopardize the particular investigational program.

DATA EXCHANGE

The world oceans are large and no one national can cover the vast expanses of the seas with the detailed studies that might be desired. Therefore, cooperation is the essence of oceanography, and it is often desirable to coordinate the plans of different nations to cover different

parts of the ocean at the same time so that relatively synoptic data can be acquired. The principle of international coordination in oceanography was particularly applied during the Geophysical Year in 1957-58. As a result of that cooperative effort, the two world data centers, WDC-A in Washington, D.C., and WDC-B in Moscow, were established. Because of the availability of these world data banks, it has been possible to bring together a great deal of oceanographic data that could not have been collected by one nation alone. It has fostered a better understanding of worldwide oceanic processes, seasonal movement of currents, the distribution of properties, and general dynamics of the world oceans.

It is generally established that national programs in oceanography provide data for international data exchange, coordinated generally through the Working Group on International Oceanographic Data Exchange in the Intergovernmental Oceanographic Commission. There are certain programs of strictly local nature that are of little interest to other countries, except in an incidental way. These programs do not normally provide data for archiving at national or at world data centers. However, as the systems for archiving and processing data become improved, it may be possible also to have these data in a national data bank. As studies on marine pollution increase, there will be in addition to more physical and chemical data, many biological data which will present a new challenge in data archiving at oceanographic data centers.

A variety of international cooperative programs in oceanography are developing. As the new programs being coordinated by the Intergovernmental Oceanographic Commission within its long-term and Expanded Program of Ocean Exploration and Research (LEPOR) become developed, there will be more data of interest to the international scientific community. Coordination of data collection, through intercalibration and standardization of methods, will be required. This particularly applies to such programs as GIPME (Global Investigation of Pollution in the Marine Environment), which is a major element of LEPOR, and involves measurements of various constituents in both water and the biota at very low concentrations. Any deliberations at the Law of the Sea Conference on the exchange of oceanographic data should foster, in every way possible, the flow of this kind of information from one country to another. It is the whole framework upon which international collaboration in oceanography is based.

Restriction of exchange of data of a classified nature, because of security reasons or their proprietary aspects, will probably continue. There is hardly any basis to promote exchange of such data unless nations agree to minimize the security and proprietary aspects of oceanographic information. Certainly a great deal of information is classified that need not be classified, and nations should be urged to review their classification system to make public as much oceanographic information as possible.

RESOLUTION OF INTERESTS OF COASTAL STATES AND OF THOSE CONDUCTING OCEANOGRAPHIC RESEARCH

Any convention set up internationally to facilitate oceanographic research would be only as successful as the good-will between the states involved in negotiations. Articles established in any such convention will have to be treated only as guidelines, with the usual flexibility to allow for unusual circumstances. Any convention accepted internationally will probably have clauses that could prevent oceanographic research from being conducted within the waters of national jurisdiction if the coastal state so wished to have it. Therefore, there must be a considerable amount of understanding on the part of both parties involved, devoid of suspicions, ulterior motives, and selfish interests. It should be clearly accepted by all nations that the facilitation of research and international cooperation in marine studies is a basis for the quest of knowledge.

On the other hand, scientists must be realistic in their demands for conducting certain types of research which may in any way endanger the ecological conditions in a coastal zone or interfere with the normal activities of that state. A nation which wishes to perform research in another's coastal waters should display understanding and patience in seeking clearance for a given program. However, the nation being approached for clearance should also make every effort to be reasonable and avoid the "red tape" that often prevails in bureaucratic hierarchies. Once any sinister overtones are removed from the application of a nation to conduct research in the waters under the national jurisdiction of a coastal state, particularly with respect to motivation for such research, then the way is paved for mutual agreement and cooperation on the research program.

Although we are generally agreed on the value and need for scientific investigations of the marine environment, we have to admit that occasionally some restraint has to be placed on the scientific community in the way it wishes to conduct its experiments. For example, in studies of diffusion of the coastal waters or even of the high seas, it is sometimes desirable to spike these areas with a high dose of radioactive materials so that these can be followed at great distances for a long time. Even though considerable care is taken in choosing the right type of radioisotope, there are times when the effects on the aquatic organisms tend to be overlooked or minimized, and these must be recognized if we are to protect the ecosystem. The solution to the problem of tracing water masses in coastal waters is now accepted internationally, with the availability of fluorescent dyes, such as Rhodamine B, measurable at low concentrations with a sensitive fluorometer with no environmental harm.

Given a free hand to do his experiments in any way he wishes, a scientist may do all sorts of drastic things, which from the sidelines, may appear almost irresponsible. For example, to determine the effects of overfishing

on a population of fishes or other aquatic organisms, he might design an intensive fishing program which will virtually wipe out a whole population. This could conceivably be an irreversible process and in this way, a stock of fish may be essentially wiped out. Major tests of certain biocides in the coastal waters may produce long-term damage to the ecosystem. All such proposed experiments have to be examined by a higher tribunal which will adjudicate them as to whether they are safe or not in the long-term.

Drilling programs on the continental shelf may be conducted in such a way that they could pose a threat to the environment, because of possibilities of escape of oil. Although this has occurred only in cases of exploration and exploitation, such as in the Santa Barbara oil spill, it could happen also in a scientific research drilling program. Such projects, as seismic exploration using the conventional type of explosive devices to obtain echoes from the sediments, are usually examined and approved or disallowed by national authorities, if they are being conducted by their own scientists or exploration technologists. However, in the case of one state coming into the waters of another state to carry out seismic explorations, it is essential that such a program, which could be damaging to aquatic organisms, be passed by the authorities of the coastal state who normally examine such programs. For this reason, a certain amount of time has to be allowed in order that the program gets proper review.

Any nation conducting scientific research in the waters of national jurisiction of another coastal state should be subject to the laws of that particular state. While scientists may be granted entry into the coastal state ports, they are not exempted from certain basic rules, and must abide by the regulations of customs, immigration and health authorities in the same way as any other visitors. The essential preparations for entry into such countries should be made by members of the crew and scientific staff, including such matters as passport, vaccinations and visas, if these are required.

Although there are parts of the world that are still relatively uncharted and unexplored, the conduct of scientific research should not be the basis for claims of sovereignty or of exploitation rights. This would apply not only in waters of national jurisdiction, but also in those areas beyond the bounds of territorial seas. Recent research in the Arctic and Antarctic has had some overtones of establishing sovereignty or exploitation rights by certain nations involved in such activities. Once it is clearly established that no such rights are attached to approval for conducting a given research program, some of the suspicions of motivation in conducting coastal oceanographic investigations will have been removed.

It should be very clearly understood by all parties concerned that there will be a free flow of information arising from the research program which is conducted by one nation in waters under the national jurisdiction of another. There must be ready access to data, samples, and to interpretive information, which should be published at the earliest possible time. The flow of scientific information would, in fact, erase a great deal of the attitude of some coastal states that another nation is learning more and collecting a larger amount of data on its waters and the sea bottom than it has in its own archives. Every coastal state should be given the opportunity to send scientific personnel on board ships of another flag that are conducting research in its waters. In this way, there is witness by the host nation to the activities of the guest researchers, and there is no better way to achieve international communication between working scientists. This can often resolve misunderstandings at the higher levels.

There should be a mechanism by which a coastal state can hold a foreign vessel and its crew responsible for any activities that may have caused damage to either the coastal environment and the living resources, or to any of the coastal installations and/or vessels or equipment involved in other activities. This would probably require some legal arrangement through an international court. While it is unlikely that disputes would arise between states concerning the right of one nation to conduct research in the waters of another, there should be a mechanism to solve or arbitrate such disputes. Again, this might be possible through an international court dealing with such matters. It is conceivable that one state may wish to appeal the decision of the host state to deny permission for the applicant to conduct research in its waters. A court of appeal might help to clarify issues and lead to a more mutually acceptable solution.

SCIENTIFIC RESEARCH IN WATERS BEYOND THE LIMITS OF NATIONAL JURISDICTION

The freedom to conduct research in waters beyond the limits of national jurisdiction will, no doubt, be a topic of considerable discussion at the U.N. Conference on The Law of the Sea. There are those people who feel that research beyond the limits of national jurisduction should be completely uninhibited. There are others who feel that beyond these limits there should be strong international control, so that the marine environment is not abused. The final outcome of the conference and the drafting of a convention involving research on the high seas will probably be somewhere in between those two extremes. Certainly, there is a strong argument in favor of some control so that irresponsible actions are not taken by research scientists of the type described

earlier. Let me cite a few specific examples of possible experiments that could be extremely damaging to the environment.

The GLOMAR CHALLENGER expedition drilled many holes in the sea bottom in various parts of the world oceans. This was a remarkable expedition in that techniques untried before were used to position a ship over a particular spot and hold it there while drilling was conducted in waters of some 20,000 or more feet. What was more remarkable was the geological findings in the cores of some of these drilling sites. For example, in the deep waters between the Gulf of Mexico and the Caribbean Sea there were a number of places where the drilling went through salt domes at depths greater than 10,000 feet. As all geologists know, these salt domes are generally associated with oil and/or gas. While it had not been anticipated by scientists that oil would be found in such great depths of the sea, the possibility suddenly loomed for the presence of oil-bearing strata beyond the continental shelf. Had an oil strike occurred, it would have been virtually impossible to plug it. The GLOMAR CHALLENGER was equipped with some of the most modern devices in exploration, including a reentry capability for the drill rig, but it did not have a blow-out prevention facility. The planners could not foresee the need for such a device. We might have had a perpetual oil pollution problem in clear, tropical waters not too far from some of the cleanest and most attractive beaches in the world.

I am sure that some scientists working on the problems of nuclear detonations in the sea would very much like to let off a small nuclear charge in order that they might study the effect of it at close hand and under controlled conditions, strictly for scientific purposes. Others might wish to use fission products derived therefrom for tracing movements of water masses; after all, some of the best data on transport and mixing in the oceans came from Strontium-90 and Cesium-137 in the sea derived from weapons tests in the 1950's. Yet this would be an addition of a burden of radionuclides to our marine environment which is only now beginning to diminish as a result of the 1963 Treaty Banning Nuclear Weapon Tests.

Experiments along the continental slope might cause sloughing of large deposits of sediment which are in an unstable state, and these could cause devastation to such installations as submarine cables, pipelines and scientific devices, through submarine landslides and turbidity currents. As it has been shown on the east coast of Canada and the United States, such landslides have disrupted communications in the past through the breakage of submarine cables in the path of the intensive turbidity currents that were created by natural seismic activity. Some of these potential problems can only be recognized by experts, and they should be consulted prior to execution of such experiments.

There should be freedom to conduct scientific research beyond the limits of national jurisdiction but these investigations should not infringe on the freedom of the high seas for navigation, freedom of fishing, freedom to lay submarine cables and pipelines, and freedom to fly over the high seas. In other words, the same principle applying to the coastal zone should apply to the open sea, i.e., there should be no undue interference with existing activities which have certain rights under international agreements.

Ocean currents know no national boundaries. They can transplant materials introduced into the water along the shores of one coastal state to those of another. In the same way, any materials that may be introduced into the high seas, either by dumping, pipeline, or barging, can be returned by way of the currents to shores of other nations. A major oil spill at some distance out at sea can result in oil being washed onto the shores of the coastal state, having drifted there through the transport of the currents and of the wind. A highly toxic chemical could drift from a shipwreck to the coast with comparatively little dilution, and disastrous consequences to coastal flora and fauna. While scientific research would not normally contribute to hazardous pollutants, except as noted above in very exceptional circumstances, there needs to be some kind of control over the activities of investigators so that even the rare occurrences could not arise of shores being polluted by harmful substances from certain experiments.

It might be possible that a mechanism could be set up for control, where a rapid screening process could be used to eliminate all the unquestionable programs immediately from further scrutiny. Perhaps the mechanism of declared national programs in marine sciences, submitted to the Intergovernmental Oceanographic Commission, could carry out this initial screening. It would be hoped that at least 99% of declared oceanographic programs could proceed unimpeded, and that even for the remaining 1% there would be a minimum of international bureaucracy involved. However, there would be some assurance that the marine environment is being protected against irreparable abuse.

ASSISTANCE TO DEVELOPING COUNTRIES

In any program on a global scale of oceanographic research, particularly where certain benefits will be derived, there should be equal opportunities provided for all nations, whether they are developed or developing. We must, therefore, recognize the need for enabling the developing countries to be able not only to acquire the information from research on the marine environment, but also to be able to utilize it effectively. A coastal state should be given the opportunity of benefiting from the research, and where this has to be done by strengthening certain capabilities, efforts should be made both in terms of facilities and training of personnel to increase these capabilities. Only in this way will the coastal

state be able to participate fully in the research and to find a suitable means whereby the scientific results can be utilized beneficially. It is a responsibility of the developed nations, through the mechanism of existing international organizations, to provide training to technical and research staff in developing countries, which would enable them to participate fully in the joint programs at a level dictated by their needs and resources.

SUMMARY AND CONCLUSIONS

It is generally accepted that all mankind is interested in gaining more knowledge about the marine environment and that the acquisition of such knowledge should be facilitated. If we accept the fact that marine scientific research is the study of physical, chemical, biological and geological processes in the marine environment, including all the non-renewable resources and living organisms, which would allow us to make more accurate assessments and predictions of oceanic processes, provide a basis for management of resources, permit a rational use of the environment for various purposes, and predict the state of the health of the ocean, then we can set a number of principles that would provide guidelines for the pursuit of research on an international basis:

1) Information on the marine environment and all its biota is a common heritage of all mankind, and therefore, should be freely circulated and exchanged among nations.

2) Every nation should have a right to conduct oceanographic research in any part of the world oceans, provided it abides by certain regulations set by national and international agencies.

3) Any nation wishing to do research in the waters of another coastal state should have the opportunity to apply to that coastal state for permission to carry out such research. The coastal state, in whose waters it is planned by another to carry on research, has the right to examine plans and details of the research program in adequate time to grant approval or disapproval for the proposed program.

4) Any national conducting research in the coastal waters of another nation has a responsibility not to disturb the activities of the coastal state, or in any way damage its resources or the ecosystem, by the research program.

5) The coastal state has the right to include certain requirements that must be adhered to in the research program in its waters, proposed by another state, including such provisos as nondisturbance of ecological preserves and total protection of certain species.

6) The visiting research vessel and crew, along with scientists, must abide by the laws and customs of the country within whose boundaries the research work is being conducted. This includes not only the laws pertaining to personal behavior, but also customs, immigration, and health regulations. The visiting crew and scientists should have the right to come on shore in any of the cities that may be visited, but they should also make the necessary arrangements beforehand, pertaining to customs, immigration, and health regulations of the country being visited.

7) The conduct of research should not entail any rights of sovereignty or of exploitation in territorial waters of any nation or beyond the limits of national jurisdiction.

8) The research program of a visiting nation should not in any way pollute the waters of the coastal state or involve collecting of excessive numbers of aquatic organisms which may disturb the populations.

9) The coastal state in whose waters research is being conducted by another should have the right to send aboard scientists or technicians to conduct research in collaboration with the visiting investigators and to have access to data and all samples collected.

10) The visiting scientists should have obligations to make available to the host state data collected and to publish significant results in reasonable time.

11) The coastal state in whose waters the program of another will be carried out has the right to ask for the name of the ship, size of ship, the size of the crew, and the size of scientific complement, including the names of personnel, if possible. Dates of entry into coastal waters, and times of proposed visits to coastal installations, along with details of the scientific program, should be submitted for thorough examintion well before the program is to take place (at least 60 days).

12) The coastal state has the obligation of responding immediately to any request for conduct of research in its waters, or at least within the allotted time, of 60 days say, for such a response.

13) A mechanism should be established whereby a coastal state has a means of fixing responsibility on the visiting ship, crew, and investigators for any damage that may be incurred during its program of investigation, including ecological damage, destruction of underwater cables or pipelines, or damage to shore installations.

14) In waters beyond the limits of national jurisdiction, there should be freedom to conduct scientific research by any nation, within the limitations set by an international body on control of such research, to prevent undue damage to the aquatic environment, or to interfere with ongoing activities.

15) All developed nations should undertake the responsibility of assisting developing nations in technology, training, and in facilities, so that they can derive the benefits due them as members of the international scientific community.

16) Any bilateral or regional agreements for conduct of cooperative oceanographic research should not in any way be interfered with, provided such agreements abide by the general principles established in international conventions for preservation of the marine environment.

In conclusion, it can be stated that the right to conduct scientific research should be available to every nation of the world, but that each nation should apply the golden rule in conducting such research in the marine environment. If nations will shed their cloaks of suspicion, selfishness, secrecy, and greed, and begin, instead, to extend the hand of good will and cooperation and to share their findings with the many nations of the world, we shall find that the increased knowledge acquired from a pooling of all the world resources will benefit all humanity.

OVERVIEW

Edward Wenk
Professor of Engineering and Public Affairs
University of Washington
Seattle, Washington

Thank you very much, Mr. Chairman. During World Series, it is not very hard to know what is expected of a clean-up batter. One of the challenges that I am going to try to avoid is to give you a box score of all the positions taken by various speakers during the last two days and especially to avoid saying who is ahead.

However, I shall try to summarize and synthesize a good deal of what has been said here today, and I trust that you will permit me the additional latitude of saying one or two things as to an overview, which indeed is the topic I have been assigned.

First, by way of background--the entire seminar has been concerned with law of the sea. We should remember that this body of law has been rooted since Roman times in the common law of property rights. And while dry land boundaries were subject to quantitative survey and describable in deeds and covenants, the seaward extension of these boundaries was limited by difficulties in marking a fluid medium and in contributing to its military defense. What we recall as a 3-mile limit over territorial waters, believed to be determined by the range of shore-based cannon, has blossomed into a far more complex thicket of jurisdictions.

The pragmatic development of sea law initially concerned only a very special group and those were people who held property--the commercial trading class. Nevertheless, as instruments of empire, the traders required protection in extending their mercantile life styles to the marine domain, and established principles that have since been frozen into the statutes of maritime law to

As the author notes, this overview is his own perception. It is not expressed as representing the consensus of speakers or other participants.
Samuel Goldenberg, Chairman.

protect property and to a lesser degree persons against perils of the sea. Some of these risks arose from the hostile environment, some from mutiny, others from piracy, still others from inept seamanship.

Maritime law only recently evolved from the ancient admiralty laws into a new branch to secure the common interests of different communities over the claims of special property-oriented interests. Indeed this is the public order of the oceans. But it is a very recent invention. In some ways it may be thought to date only from about 1930 and not to be codified until 1958. While this codification was a necessary condition, it was not sufficient because the dynamics of decision-making and subsequent enforcement complete the process and they bring into play all of the social and political interdependencies that transfer ocean activities to the broader geopolitical theatre. In the world today no state is free to do what it wants. Not even the United States. Nor the Soviet Union. Nor China. All nations are imbedded in a web of a closed system so crowded that any action creates a ripple of reaction. Given the atomistic, pleuralistic quality of the international community and the almost universal consensus against a centralized world government, a minimum, if not optimum, order has been exercised by diplomatic instruments of accommodation and retaliation supported by implicit economic and military measures of coercion. But primarily we rely on voluntary commitments from various states.

These are the historical roots that I think of greatest relevance to contemporary marine law. With growing emphasis since 1966, the public order of the oceans elicited another set of concerns--freedom of access, freedom of innocent passage, freedom of exploitation of use, and freedom from abuse of the oceans and seabed beyond predetermined sovereign limits.

This evaluation reflected the impact of technology and indeed technology extended the two-dimensional oceanic arena for navigation to a three-dimensional medium involving the fish and seabed resources, an extension that has jarred customs and institutions and law.

Law is by its practice conservative. Technology, on the other hand, in its capacity to induce change is radical. Hence a real dilemma.

The contemporary legal framework is also influenced by a new political phenomenon--the emergence of new nation states. And insofar as the sea is concerned, these states never had a merchant class and therefore historically view uses of the sea from quite a different perspective than did western Europe and the United States. For these new states, self-interest dictates exploitation to achieve swift economic parity. Herein lies the common rather than competitive basis for a plurality of global interests. When we consult the future, we find that we should expect more dividends from intensive use of the sea. Fishery production could readily double in 10 years and eventually increase by a factor of four without depleting stocks. Aquaculture is likely to expand. The extraction of all off-shore oil and gas should increase by

the year 2000 by a factor of five, maybe more. Revenues to governments from off-shore rents and royalties could amount to $50 billion over that interval. Worldwide shipping will increase in the next 30 years by a factor of four. Offshore platforms will be built as sites for nuclear power generation, for supertanker terminals, and metropolitan jetports. But in contributing to humanitarian concerns--inexpensive fish protein could counter, by the year 1980, 20 percent of the nutritional deficiencies worldwide. Ports and harbors that domestically have become the festering sores of urban decay could be rehabilitated and bays and estuaries could be protected from pollution for future generations.

And in the world community opportunities will expand to recognize that world order might be improved by placing portions of the sea off limits to weapons of mass destruction, and I am not just referring to the seabed. International arrangements could assure that living resources are harvested in an equitable manner while maintaining continued abundance and that mineral resources are extracted in a way to benefit developing as well as developed nations. Pollution could be reduced, and, in fact, the concept of the marine environment as a common heritage of mankind could be employed to foster international cooperation and new avenues for international understanding. We all have come to know that these opportunities are what sparked the proposal by Ambassador Pardo at the United Nations.

Just by way of a slight digression, since it was referenced to earlier this morning, these geopolitical implications some of us believe were first publicized by the Commission to Study the Organization of Peace. As you know the commission chaired by Clark Eichelberger is a research affiliate of the U.N. association. I think some of us also believe that the motivation for this proposition was to derive independent income from seabed resources for a fiscally embarrased United Nations. But it was also rationalized as a policy initiative to avoid controversy and conflict arising from competing claims, to assure economically effective use of ocean resources, to reduce military uses, to avoid ocean contamination, and to provide equitable distribution of benefits.

This brief history permits us to identify three eras on an international scale with regard to ocean activities. The first one dating until about 1965 or 1966 was essentially one of indifference. Beginning around 1966 and extending until 1970, the second era was one of uninformed enthusiasm, accompanied by a new desire for cooperation. But about 1970 a third stage of international development opened even before the second era had a chance to mature. The quest for institutional solutions ushered in a new era of conflict and these debates in various international forums identified two contrasting strategies that may guide the future. The first was an extrapolation of traditional territorial boundaries from the landward activity into the marine theater, and such volatile questions as narrow or wide extension of national sovereignties so preoccupied opponents that they lost sight of their initial rhetorical dedication to global comity. The seaward extension of historical property concepts led to further unilateral claims of jurisdiction over living and seabed resources and even over scientific research.

So the theme was proprietorship, rather than rational management. As a consequence, there was some encroachment on common resources. There was instability in relationships among nation states, inequitable distribution of benefits, the hazard of depletion of living resources, an attitude of first-come-first-served basis and certainly jeopardy to the health of the environment. Indeed I believe these are the indications of how the existing state of law of the sea has failed.

The sea and conflicting strategy was based on the interconnectedness of marine activities, increasingly denoted by the use of the term in the last two years of "ocean space." There unfolded, for example, an awareness that the wastes of national origin dumped at sea may be distributed globally. And while such threats were not regarded as immediate or of crisis proportions, at least by most of us, nevertheless a pervasiveness of the fluid media potentially exposed all nations to the same risk and uncertainty. So whatever the geopolitical and geoeconomic arguments were in debate, and no matter how parochial, participants began to realize that all of their interests were shared. Global information, therefore, began to be one of the characteristics of a rational approach to management and thus to law.

On the basis of this perspective, your speakers have done a remarkable job in a very short time of illuminating two important aspects of where we stand today. None of them opened their presentations with a statement of premises, and very few even wanted to say exactly what the issues were they were addressing. Nevertheless, out of the conference has come an amazing array of premises and an even longer list of issues, and I would just like to attempt to summarize these for you because I think they will by themselves perhaps pinpoint where the problem lies.

As to premises, and without identifying any with individual speakers, and with poetic license for a few of my own. The first concerned the growing role of the oceans and the increase in appetite for resources. The second premise is that all nations have interests in the ocean. A third is that national self-interest is today the primary driving force. Another premise is that we should come to expect all living organisms to act in such a fashion as to expand their influence, but while that may sound cynical, it is the very basis of the policy process. This leaves, however, the question of what organism we are talking about. I will come to that again in a moment. A fifth premise is that the existing system of law has failed with regard to conservation, with regard to allocation of resources, with regard to conflict avoidance.

Some of the next premises are more technical. Our fishing industry is not monolithic and cannot be treated as though it were, in dealing with policy. Another premise, and here there may be some debate, is that the exclusion of foreign competition in our coastal waters is not a guarantee of well-being of our domestic fisheries. The seventh premise concerns the interpretation of the continental shelf convention, and here I think it is clear that there

are widely varying interpretations. One view by the National Petroleum Council, that has been very eloquently defended by Mr. Finlay, is a legal interpretation as to the extension of sovereign rights over the seabed. But there are other interpretations by many other legal authorities that place a quite different interpretation on the 1958 convention; nevertheless, many of the arguments we have today stem from some premise with regard to that interpretation.

Yet another premise is that man now has the capacity to destroy himself. A further premise is that we have a pressure group society and we will say a little bit more about pressure groups and special interests in a moment. One of the aspects needs a further premise with regard to our pressure groups and all of us are members of at least one, and maybe many, with which to express our preferences in our society. Every interest taking an initiative interacts with another. As some of you have heard me say before, it is hard for any interest group to take an initiative without stepping on someone's toes because we have wall-to-wall toes.

Another premise, and now this is mine, is that man does have the capacity to control his destiny and, therefore, I am unwilling to accept a view that we have lost control, either to human greed or to technology. And I guess I have to say as a nonlawyer that I believe the way we are going to do it is through the law. Another premise, now with regard to the law of ocean space: There is such a thing as creeping jurisdiction and I believe it is clear from many of the things said that it is safe to make the premise that it is here to stay.

Now some premises with regard to the developing nations. It was not said explicitly, but it has been implied that "daddy knows best," and I think there are certain premises that extend from the U.S. beliefs in developing its position on the basis that we indeed do understand the developing countries and what we are doing is in their interest. In fact it really may be, but I believe that there is ample evidence based somewhat in history and somewhat in contemporary tactics that we have not persuaded the developing nations themselves that we have their interests at heart. But there are some premises in our positions in this regard.

Another premise is that the U.N. majority vote does not necessarily assure wise action. Having said that, I would like to point out that there is another set of premises that I did not hear stated today or yesterday that are rather surprising. There is a document which says that "we the peoples, determined to save succeeding generations from the scourge of war, to reaffirm faith in fundamental human rights, to establish conditions under which justice and respect for obligations arising from treaties and other sources of international law can be maintained and...that the purposes and principles of this organization are among others, to maintain international peace and security, to develop friendly relations among nations, to achieve international cooperation in solving international problems of an economic, social, cultural or humanitarian character." You know that I am reading from the Charter of the United Nations.

I think it is rather interesting that all of these premises stem from a set of self-interests that do not admit that we are members of the human race. To go one step further with regard to premises, we have to come back to this question of living organisms acting to defend their own interests, and I am going to try to answer it before I am through concerning whether this is true as an individual, as a nation, or in fact as a citizen of the planet.

Having laid out these premises, here are what your speaker felt were the issues that were illuminated at this meeting.

Number one--that we must look to international management for wise use of the sea. Number two--that we must be concerned for the allocation of marine resources, including those in the case of living resources that are under-utilized and we are obliged to think inevitably in terms of a quota system. Number three--that there is an issue in maintaining the productivity of fishery stocks. At the same time there is another related issue with regard to the environment, and this concerns the perception of threat and the development of international mechanisms related to early warning so that indeed we can separate myth from fact in terms of a threat to the environment. But we dare not take a chance that we can neglect it.

The next issue concerns the role of science and the freedom to conduct research because of the need for facts in solving every one of the other problems. Those issues deal with the oceans explicitly. Now a set of issues concerned with the world community:

1. Goals. Here we have issues dealing with the avoidance of conflict and the enlargement of benefits. This means not only increasing the total benefits to be derived from the marine environment but also the wiser and more equitable distribution of those benefits.

2. The identification of losers and their compensation, which carries with it, as well, a point that has been repeatedly made on compulsory arbitration.

3. Now a set of issues that deal with the participants themselves. And these concern the stability of investments or the needs for stability of a legal regime, in order to encourage investments. We recognize that marine resources do compete with land sources and must be thought of in those terms. If any of you from the fishing industry feel otherwise, let me make a bald statement that one of the reasons that fish protein concentrate has been delayed has been the invisible intervention of the dairy industry. Another concern is that of a free market for metals.

Now a set of issues concerned with a more global approach to the oceans and here the issues are with regard to global authority, its rights and the privileges. There are also questions of dealing not just with global authority, but regional bodies and a whole host of the questions then on utilization of existing specialized agencies of the United Nations far more effectively than may have previously been the case.

Related to this question of a global authority is the freedom for unilateral action among individual nations and this, of course, opens up questions, both with regard to those who are now actively participating in the sea and also to new entrants. This leads to a further issue of boundaries, and here we open the whole question of the specific sovereignty of coastal states, the blurred authority at some boundary with an entity we might say having universal sovereignty, and then the activity of such an authority with universal sovereignty.

In order to develop some basic concepts, we find ourselves sooner or later coming to this issue of what we mean by common heritage that has been opened up for years, but which has been sidestepped. With regard to the United Nations itself, there is an issue of institutional reform. A question that is very much before the house is whether one dares consider innovation with regard to entirely new institutions or ways of dealing with the United Nations, the General Assembly, the Seabed Committee and its specialized agencies, so as to gain some better effect toward all of the issues that we mentioned earlier.

Finally, a set of issues concern the U.S. position itself. We have heard one of the speakers refer to the possibility that our position is being watered down to that of a common denominator in order to get an agreement because no agreement is worse than the weakest agreement.

Well, it turns out that a committee of the President appointed last year by legislation, the National Advisory Committee on Oceans and Atmosphere on which one of the other members of this meeting and I myself have the privilege of serving, issued a report last week which has a chapter on international issues related to law of the sea, and I would like to read two or three sentences from it. "We conclude that the present situation is unsatisfactory internationally," and, this is the most important thing: "that the current U.S. procedures will not suffice to achieve U.S. policy goals." In the softest possible language that is saying that something is wrong in Washington, D.C. in the way we are approaching it. This now is a presidential advisory committee having the courage to criticize in an election year.

NACOA has been critical of the activities of the working group of the law of the sea in the U.S. executive branch because of an apparent diffusion of objectives and lack of sharply developed policies or positions. There is the ever-present danger of weakening of objectives under the grind and tedium of a 100-nation debate. Now what position does this committee recommend? It is an emphasis on the common heritage theme. But here it is interpreted as a necessity for freedom to explore, freedom for navigation, and freedom for simple human enjoyment. These are not property rights and therefore may need some further legal interpretation. Nevertheless, here is an advisory committee indicating some degree of dissatisfaction with our own U.S. position. What this amounts to, in my view, is calling attention to the fact that we have not done very well in preparing our positions.

First, we have erred in not really setting forth our own fundamental objectives in what we wish to achieve in the way of world leadership. Instead, our tactical approach has been to estimate a winning-losing situation with obviously some nonnegotiable demands. This point of view has blurred some of the higher principles and, if you will, idealism which I for one would suggest we continue if we are to maintain our position of world respect and leadership. I do not believe that idealism is the opposite of realism. I certainly do not believe that idealism is the property of college professors. But there is a question of how one maintains this under the tactical maneuvering of debate.

The second thing that strikes me as missing is the fact that we have not done our homework as a government in terms of making sure that these policy options are not only developed for those few officials who are negotiating but for those who are citizens. If anything, this meeting which some of our citizens called on their own initiative is an effort to meet some of that vacuum. Nevertheless, consultation that one expects by a government of the people affected--and I do not mean only special interests--has not been a characteristic part for the development of a U.S. national position of the law of the sea. When we say U.S. national position, we also have to ask the question of what we mean by that in terms of national interest. There was a little discussion earlier today that somehow or other one could think of national interest as being the sum of special interests. I have the feeling that that is not quite true. Exactly what is the national interest is hard to tell any more; in pluralistic society it is never easy.

Just to make this point explicit, when we hear from our corporations that they are interested in the national interests, we have to ask whether these are national or multi-national corporations speaking, and if they are multinational corporations, then this question of whether their expression of interests coincides with the national interest deserves some special attention. It is very easy to overlook the fact that when we are dealing with marine resources, some of our industrial friends, at least, do business worldwide. Indeed we are pleased they do. But this complicates the question. How do special interests seek to influence our positions? Most of us, I think, have welcomed the heat of debate in order to try to forego a consensus. Indeed, one must if the nation is to make progress. The question then is is one of tactics and whether these positions are developed in the visible theater of debate with access by the press or by invisible tactics. I believe this is a key point when the U.S. government develops any position.

Finally, no matter how sincere any of these interests may be, there is a real problem for every one of us on how to balance the short run versus the long. This I believe is at the heart of the whole matter. It is not surprising that an individual, uncertain about his sustenance for tomorrow may discount the future quite heavily. It is not surprising if a nation does this.

For the oceans, I submit we must begin to take the long view--for political, economic and social well-being of a planet where the oceans that divide nations may also unite them.