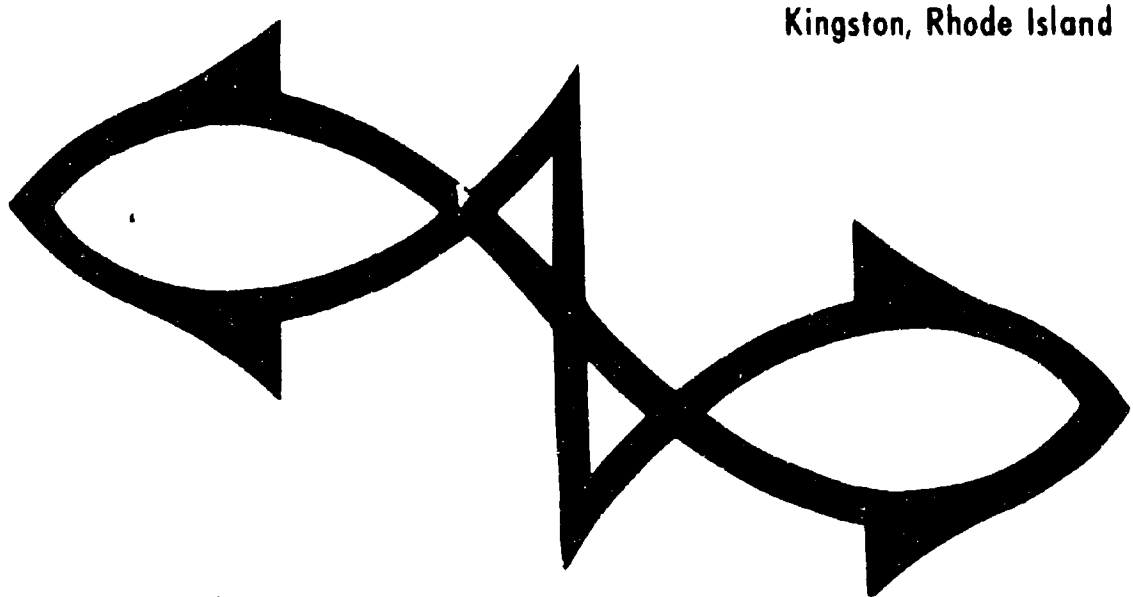
THE LAW OF THE SEA

The Future of the Sea's Resources

Proceedings of the Second Annual
Conference of the Law of the Sea Institute
June 26 - June 29, 1967
The University of Rhode Island
Kingston, Rhode Island



Edited by:
Lewis M. Alexander

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THE LAW OF THE SEA INSTITUTE

Executive Committee:

Advisory Committee:

INTRODUCTION

Lewis M. Alexander
Executive Director

The Law of the Sea Institute, which was formed in early 1965, is designed to facilitate the exchange of information and ideas among lawyers, scientists, business and government officials on problems relating to the control and use of the marine environment. The Institute's first annual conference was held at the University of Rhode Island on June 27-30, 1966. The proceedings of that conference have been published by the Ohio State University Press under the title, The Law of the Sea: Offshore Boundaries and Zones.

These 1967 proceedings include not only the papers presented at the conference but also verbatim transcripts of some of the discussions. In selecting portions of the discussions for publication it was found that some transcripts were too poor to be utilized and that in other cases the discussion material contributed little to the goal of pointing up relevant concepts. There has been minimal editing of any of the conference material.

Two contributions, although not presented as part of the conference program, were accepted for publication in this volume. In the rear cover of these proceedings is a copy of a map of the world's ocean floor prepared by Dr. Francis T. Christy, Jr., and displayed at the conference. This map portrays how the pattern of national ownership of the oceans would appear if all nations were free to advance their boundaries out to the median lines. Its purpose is merely illustrative, and the map should not be construed as suggesting support for this type of regime by Dr. Christy or by the Law of the Sea Institute. Additional copies of the map may be secured for $1.00 each from the Law of the Sea Institute, University of Rhode Island, Kingston, Rhode Island.

The Executive Committee of the Institute wishes to thank the three federal agencies which have provided supporting funds for its activities: the Office of Naval Research, the Bureau of Commercial Fisheries, and the Environmental Science Services Administration. In addition, the Committee expresses its appreciation to Col. Elisha O. Peckham, Mr. Thomas White, and other officials at the University of Rhode Island for their assistance in managing the conference.

Kingston, Rhode Island
January, 1968

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Dale C. Krause
Associate Professor of Oceanography
University of Rhode Island

Welcome to the Second Conference of the Law of the Sea Institute and to the University of Rhode Island. As you know, the topic this year deals with "The Freedom of the Sea's Resources." A chief goal of the conference is to bring together people concerned with the law of the sea and to discuss freely in a non-political environment. We shall be spending four days together of, I hope, interesting and fruitful discussion. The conference is designed to identify, discuss, and investigate problems (1) while they are still small or theoretical, (2) to do the same to the large problems which may be unrecognized or whose implications are not yet fully realized, and (3) to hold useful discussions in a relaxed, non-political atmosphere on the really tough problems.

This conference, you in the audience, is composed of the men who are instrumental in creating the problems, of men who study them, and of men who must solve them. Now the answer does not come in preventing the causes of the problem, if this requires preventing activity at sea, but in the creative resolution of the potential conflict. I emphasize that this is not merely jargon. The creative method of resolving fishery disputes is not to prevent fishing but to allow fishing compatible with fishery stocks, national goals, historical precedents, and so forth, leaving as much basic freedom as possible to the participants whether they be men or nations.

Let me give some background material on the Law of the Sea Institute. The Executive Committee consists of:

Dr. Lewis M. Alexander, Executive Director, Department of Geography, University of Rhode Island, Kingston, Rhode Island

Dr. William T. Burke, College of Law, Ohio State University, Columbus, Ohio

Dr. Francis T. Christy, Jr., Resources for the Future, Inc., Washington, D.C.

Dr. John A. Knauss, Dean, Graduate School of Oceanography, University of Rhode Island, Kingston, Rhode Island

Dr. Dale C. Krause, Graduate School of Oceanography, University of Rhode Island, Kingston, Rhode Island

The Institute has an Advisory Committee which consists of:

Mr. Edward W. Allen, Allen, DeGarmo & Leedy, Seattle, Washington

Dr. Wilbert M. Chapman, Van Camp Sea Food Company, San Diego, California

Hon. Arthur H. Dean, Sullivan & Cromwell, New York, New York

Prof. Myres S. McDougal, School of Law, Yale University, New Haven, Connecticut

Mr. Richard Young, Van Hornesville, New York

Each of our motives behind the formation of the Law of the Sea Institute was as different as the man himself, the common factor being the concern regarding the law and the sea. Rather than cover all of the motives, let me as a scientist, a marine geologist, discuss my concern which can be divided between the social and the scientific.

My social concern stemmed from the recognition that our oceanographic discoveries can lead to international discord, both over new resources and new territories. I took part in the early manganese nodule explorations during IGY. This topic will be discussed during the conference. My bathymetric surveys establish limits of the continental shelf and thus the precise limit of a nation's influence. Although the surveys have a solely scientific purpose, they have a real, if subtle, social effect. As such I must be concerned with the social impact of my research.

My scientific concern with the law of the sea concerns freedom of inquiry. Freedom of inquiry is absolutely essential for valid scientific research. Restrictions of this freedom demonstrably inhibit science and lead to inferior science. Such restrictions are deplorable yet territorial restrictions are increasing for oceanography today, not only by foreign governments but by our own as well.

Oceanography by its very nature is international in scope. Not only is the environment basically international, but cooperative research is necessary and widespread, an integral part of the basic framework of the science. The R/V Trident of the URI Graduate School of Oceanography has carried out research over the shelf waters of seventeen nations with many foreign scientists participating on board, a typical situation with oceanographic vessels.

The territorial restrictions are of two types, restrictions on national ships and restrictions on foreign ships. I don't believe that national governments recognize that territorial restrictions on scientific research at sea by foreign vessels actually hurts their own national science because of the two-way international flow of information. Also restrictions on foreign ships often induce reciprocal action by the concerned countries.

I emphasize that "science" by definition must consist of published or otherwise reported research. I do not include here the various aspects of applied research that are not reported, but which are often of real importance to a nation. This topic will be well covered during the next few days. Here national interests begin to conflict at the practical level. However, again a long term interest for any nation requires as great a freedom of inquiry as possible.

Thus as an oceanographer, I require the right to pursue my research to any corner of the world with a minimum of restriction and red tape. On a reciprocal basis but also because of a real need, that same right must be shared by my foreign colleagues. On the other hand, we must be aware of the social consequences of our work within the context of the pride, fears, greed, and ignorance of nations and of the sheer size of the effort of a few nations. Ways must be found to allow freedom of activity while responding to the very human feelings and needs of nations, ways which this conference will explore.

Greetings from the University - Acting President, F. Don Jane

Mr. Chairman, Distinguished Participants, and Visitors: Some of you might think it is quite a chore to run from one meeting to another but I find I enjoy it and regard it as a privilege because it gives me a chance to meet the various people coming on the campus. The only frustrating thing about it though is this; I see the program that is outlined for you this week and I wish I could drop all the duties in my office, forget about the office, and come over and join you.

We are delighted to have you on our campus. You know, Rhode Island is categorized sometimes as a state which is filled with a little bit of land surrounded by a lot of water. It is a very natural thing, geographically, that here at the University of Rhode Island we should be very strongly oriented to the marine sciences. These marine sciences touch not only our Graduate School of Oceanography but on every area of the University, including the College of Agriculture, Arts and Sciences, Engineering (we have an Ocean Engineering Department), and the Institute of Ocean Technology. In every field we are very strongly concerned about the sea and the resources of the sea. This is why we are very glad to have Professor Alexander building up this Law of the Sea Institute, bringing people such as you from all around the world together to deal with the future of the resources of the sea, recognizing that this is one of the frontiers we have yet to explore.

It is a pleasure to welcome you officially to our campus. We hope that we can continue to provide this kind of good New England weather for you the rest of the week. We hope you enjoy your stay. We feel that we will profit by your being here and we hope that you will profit also by joining together with your colleagues around the world in this important conference. Thank you.

FRONTIERS OF MARITIME LAW

Edward Wenk, Jr.
Executive Secretary
National Council on Marine Resources and Engineering Development
Executive Office of the President
Washington, D.C.

Dr. Alexander, Dr. Krause, ladies and gentlemen: It is a very great privilege to speak from this podium at the University of Rhode Island today. For such a small state it should be very proud of its achievements of such interest to this audience--achievements not only in marine sciences but in the broadest reaches of science policy. Those of you who are residents of this state know how very important were Representative Fogarty's contributions to the great advances of medical research in this country. You should know, too, how very important are the contributions of your two senators--Senator Pastore and Senator Pell--to advances in this field. The sea grant program was born and bred on this campus and I am sure there are other new programs that have distinguished the university in science.

I should like to congratulate those who founded this Law of the Sea Conference. Your initiative demonstrates an imagination and a vision in advance of the legislation which last year marked the turning point in the affairs of the marine sciences in this country.

Giving a keynote address is also somewhat of a responsibility and, in this particular instance, I approach it with some apprehension. First of all, there is always some difficulty for a person from one profession communicating with those of other professions. I remember the story that Adlai Stevenson once told, who as a lawyer had been invited to address a group of scientists. In remarking on this problem of communication he said, "As long as he had been invited he understood that it was his task to talk and the audience's task to listen; and it was his great hope that they would both finish at about the same time."

Well, I have some apprehensions from yet another point of view that arise because most of us in public life make it a principle to never address an audience where more than 10% know more about the subject than the speaker. This is a case where 110% know more than the speaker. The best thing, of course, would be not to talk about this subject at all but about something else, but I am afraid that the discipline of your chairman is going to compel me to talk a little bit on the subject of the law of the sea.

If I were to entitle this address it would be to bring two old-fashioned words together in a way that strangely enough I have not seen before: that is to talk about "Frontiers of Maritime Law." We have used the term "frontier" a good deal in talking about geographical exploration and we have used it in reference to technology. But for some reason or other we have not recognized that one of the most important, challenging, and exciting qualities of this maritime enterprise concerns possible evolution and change in the law which governs these activities.

When we talk about law and technology together, we come to recognize that these two elements were independent catalysts in bringing the marine science affairs to its present state. In the first instance, a technological readiness now permits man to do almost anything in the sea that he wishes to do. And in recognition that what he does there must be subject to international agreements, we have the collateral advantage of the 1958 Convention which was ratified in 1964 to set some new ground rules.

We should recall, notwithstanding these new stimuli, that law and science are not necessarily mutually compatible. Some of you may remember that one of our state legislatures some years ago attempted to pass a law stating that the value of pi is 3. Now the reason for this was that members of the legislature had heard how difficult it was to pin down the exact value of pi, and rather than leave this to the anarchy of science, this group decided that it was far better to systematize the regime by passing a law. While there could have been such a law, pi is not 3. We might also remember the attitude of lawyers in some of our state legislatures to the theories of Darwin. All I can say is that some of our existing maritime law reflects an ignorance of nature just as great as the two cases I have cited.

This leads us to the real problem of how to blend natural science and political science.

Those of us who have worked in the vineyards of natural science have come to recognize that we share an appetite for change. The real excitement of science lies in new discoveries, in building brick on brick with change. But the same is not true with human law. There we find that we must be concerned with a stability of a system of relationships between the participants. Sometimes that stability is constructive because it fosters progress but sometimes, too, it can freeze progress. In the particular area of marine sciences, we are faced today with an unprecedented opportunity to make a contribution by change and the three points that I would like to leave with you here today are:

-- First, to emphasize how very important has been an act of law by the United States Congress in establishing a mandate for the future of the marine sciences in this country and how it has been implemented in the past year;

-- Second, to talk about the relationship of law and technology;

-- Third and most important, to suggest that the United States can exercise leadership in this area of legal research and advances just as much as it can in technology.

We have an opportunity to construct a legal milestone of historic importance by which the United States thought through and provided the opportunities for other nations, for states, for industry, and for the universities in this country to work together to carry out the fundamental intent of that legislation for the sea to benefit all mankind.

First, with regard to the mandate itself. Most of you have read the law and the report that the President transmitted to the Congress in March of this year. So I am going to assume sufficient familiarity on your part to go on to interpret how those of us associated with this new enterprise look at the "map" of marine science affairs.

In the first instance, we have tried to understand how the sea relates to human affairs. Here we find that the activities that take place on land do not stop at the water's edge. Rather than carve out the universe of activity that has salt water as a common denominator, our first attempt is to understand the relationship of maritime activities to activities on land: to military security, to a better understanding of wind, tide, weather, and sea conditions; to exploration and development of mineral and energy resources of the seabed; to understand and to utilize the living resources of the sea; to take account of the importance of our very scarce seashore resources--to understand better its uses for recreation, but also to recognize the insults which man himself renders to his own environment, unintentionally but with severe effect. And we must not forget also that the seas have been a bridge of communication and culture between the different nations of our planet. At a special time in history when we are trying to seek means for a peaceful, orderly world, we must look hard and imaginatively at the sea as a means for improving communication with other nations.

One of the first things, therefore, that has been done is to interpret the legislation in terms of these broad goals: to understand mankind's shared concerns about an orderly world, about famine, about health and disability, about the better quality of life itself, and about economic growth. Then for these old problems we try to determine how the sea might provide new solutions. The structure of government today is no different than it was a year ago. The means for carrying out these different missions still resides with the operating agencies. The role of our Marine Sciences Council, which was established by the legislation, is to assist the President in providing a coherent, coordinated, balanced set of programs and policies so that with the eleven participating agencies we do not find ourselves running off in twenty-two directions.

I find myself as an engineer often looking for simple analogies to try to understand what we do and how we do it. I tripped over one recently that perhaps best explains the role of this Council. All of you are familiar with the manner in which a beam may carry a load imposed at its center and supported at the ends. If you made up such a beam out of a series of laminated strips then this beam would deflect under load a certain amount. You are all familiar, since every one of you has probably used plywood, how important the cement is between two laminations to increase the stiffness far beyond that of the original laminations. In attempting to utilize all of the past advances, the strengths and the creativity of the separate federal agencies, the Marine Sciences Council, like a cement, seeks to gain an effect that is greater than the sum of the parts.

The first year has been a year of transition. The law was a turning point. It is significant in thinking about the law of the sea not to forget the role of public law and the processes of Congressional study that went behind the generation of the Council and of the advisory Commission.

This transition reflects the move from merely describing the sea to an intensified concerted national effort to utilize it. It reflects the broadening of involvement from science to technology that now includes not only the oceanographers who are the important core of this activity, but engineers, economists, lawyers, public administrators, foreign affairs specialists, bankers, businessmen, industrialists and, hopefully, some old-fashioned explorers.

Another element of this transition is to go from program planning to policy planning. This escalation, if you will, brings in another cast of participants different in kind from the first set. In addition to the many different disciplines involved, you now have many different levels of concern. Most important now is the fact that this level of concern extends to the President of the United States, the Secretary General of the United Nations and, based on conversations I have had the privilege to conduct recently with heads of six nations in Europe, right to the heads of those nations.

One of the bits of genius of this legislation is the call for the Council to undertake legal studies concerned with the resources of the sea. I won't go into great detail other than to say that we have begun this task by trying to identify the issues which depend upon the legal regimes; secondly, to encourage two of the Federal agencies that have key responsibilities here--the State Department and the Department of the Interior--with funds from the Council to begin these legal studies on contract.

We have a timetable connected with these studies that may be unusual in the process of undertaking legal research, much less any research. But it is our earnest hope that the Council and the Commission will have the benefits of these legal studies soon enough to utilize them in connection with the prescription of the legislation that by this time next year the Commission will have developed a long-range plan and a proposal for a possible re-alignment of the federal agencies which will go to the President via the Council and to the Congress. And it is our hope that whatever plan is developed does so in full light of the alternative legal regimes that are available to us, with some understanding of the implications of each and the consequences of each.

One of the interesting qualities of the law in this respect is that it casts a long shadow ahead of it. In referring earlier to the fact that the law itself changes much more slowly than does science, it does so for some very good reasons. Any of you who have thought about this question recognize that there are certain time constants in the affairs of men. Someone once said that the fastest thing that can happen happens in nine months. Whether or not this is true, progress is not made rapidly when it involves the affairs of men and especially when it involves different institutions and different vested interests.

In this context, we have to recognize that the law comprises the "rules of the game," and different sets of players may have different rules. One set of rules is concerned with relationships between the different nations; another set of rules governs the game between the federal government and our states; a set of rules governs the role of the federal government in relation to industry.

Rules are established for two main purposes: they are to protect interests of the individual by preserving his rights. In the United States, we have also come to learn that our public law is an important element of protecting society against the excesses of government itself.

As a starting point, we must identify the vested interests (and I say this without any editorializing), to understand the relationships today between the nations, between the federal government and the states, between the government and industry, and then to examine what opportunities lie ahead for which changes in the game may be indicated.

In looking at the consequences of alternative legal regimes, we recognize that there are not only different regimes of inter-governmental relations, federal-state relations and so on, but there may well be separate regimes as they relate to fisheries, as they relate to mineral rights, to scientific exploration, and to our important military interests. These are not necessarily compatible, and from where I sit it seems important not to examine each completely independently but to understand how they may relate to each other. I know that there is an eternal quest in the physical sciences for an understanding of the universe and one unified law which will relate electro-magnetic energy, gravity, and magnetism. It has not been found. I am not sure that there will be one, unified, coherent body of law relating all of these activities, and I am not at all sure that we should wait or can wait until that panacea is with us. It seems to me that we must have the broadest possible perspective as we examine each of these separate ingredients and find how they relate to each other.

In so doing, I would suggest that there is an important ingredient of science here in order that we do not end up with laws that say that pi is 3: It is critically important to understand something about the natural environment about which the laws are being made.

It turns out very curiously that some of the toughest problems occur at the boundaries. They occur not only at national boundaries but at the margin between the ocean and the sea coast, at the interface between the surface and the air, and at the seabed. With fish arguing with each other, there is probably a problem within the medium itself. As we look at these separate problems it seems to me that there must be a continuing dialogue between the scientists and those engaged in legal research in order that there not be the development of a law that is in a direct contradiction to our understanding of the environment. Conversely, those scientists engaged in leading this endeavor should gain clues from the lawyers as to what research ought to be conducted on a priority basis so as to provide the necessary understanding by which the law could be developed rationally, constructively and in harmony with the sciences.

When I mentioned before that we have to recognize the existence of vested interests I want to note first the need to do this on an international basis--to look not only on those nations which have historically vested interests in the sea but to look at those that do not have historically vested interests in the sea but might well have. Here, we come to grips with one of the major problems that we are faced with today, the contrast between the developed nations and the lesser developed nations.

As I mentioned earlier, every activity in relation to marine sciences has a terrestrial counterpart. The same thing is true here. There is a technology gap. We have to recognize that that technology gap is more important as between the well-developed nations and the smaller ones than it is say between the United States and Western Europe. The second gap has gained a good deal of recent attention but it is also gaining, I think, a good deal of understanding. There is a far more serious technology gap between the developed nations of East and West and the less-developed ones. That gap is growing and as the less-developed nations recognize that technology itself is a resource, they are going to have their own views as to how that technology is going to be exercised in their interests or against their interests.

What I am saying is the great energy and innovative capacity of this country to produce new technology is now going to have to be matched by the same quality of statesmanship and wisdom in learning how to use that technology in the long-run best interests of this country. I emphasize long-run best interest because most of us believe that the long-run best interest of this country is also the long-run best interest of the world at large. This is why we have to try to put ourselves in the place of some of the less-developed nations and look at the sea and at the new technological developments from their point-of-view as well as from ours. It is for this reason that the report of the President to the Congress in March, in listing some nine new initiatives for the current fiscal year, listed first the area of international cooperation. This was deliberate; it was thoughtful; it may prove controversial, but the President has taken a position already and all of us in government feel obliged to support him in this regard--to make sure that we do not have another colonial race for the resources of the sea. As we seek to utilize the resources of the oceans more effectively, we must be sure that we do not inadvertently stir rivalries and conflicts which will only block and ultimately frustrate or even cause complete failure of our other plans. We have taken no positions on any of these issues. I underscore that, but we are working hard to understand what these issues are, to understand the alternatives and to weigh them in the councils of government and to develop whatever policies then seem to be in our best long-run national interest.

I am pleased to report to you that on this trip in April with the Vice President I had the opportunity of meeting with the heads of six nations, with the science advisors, and with the most senior marine science officials of these six countries. These were the United Kingdom, France, Italy, the Netherlands, Belgium, and West Germany. I was impressed with the fact that they had already studied our legislation that was passed last summer and were just beginning to recognize that the problems that the United States had in mobilizing its own activities also existed in each--similar in kind and even similar in degree to where we were maybe seven years ago. I say this without judgment of their programs but simply reflecting the fact that the United States has already exercised leadership in identifying the importance of the sea and taking the necessary steps to provide a legislative mandate and leadership to advance the program. Their first steps, therefore, may be to examine their own internal operations and see what they may do in order to strengthen their activities. There are two predictable consequences of this--the first is that they will discover that in most cases they will look to some cooperation with their neighbors, perhaps through some pan-European program by which their aggregate activity may, in fact, have important impact. Secondly, I think they will look to the umbrellas of multilateral and bi-lateral agreements with the United States by which their programs can advance to meet their interests in harmony with ours. In so doing, it is interesting that in every case these representatives stated that if they are to be a partner in some kind of cooperative enterprise they want to pull their weight. It may take a little while for this ambition on their part to be realized for their problems of internal organization are at least as difficult as ours.

As your keynote speaker, let me end with a key note. It seems to me that we have an unusual opportunity to build something, almost as though we had an enterprise that we could design from scratch. It is, of course, not quite this way. In comparison with the space program, we have far more of a history with which we must live; there are far more interests already involved in the sea than there had been in outer space. Parenthetically, there were vested interests in the outer space program and all of you may remember the efforts by the Air Force to prevent the establishment of the space act and of NASA. The space program has met many of its goals, and it has met them effectively. It has drawn on all of the imagination and creative qualities of this country, in the federal government and in the universities and in industry. We must learn from that precedent that we must do the same thing here in the marine sciences field.

Here, however, we are much more concerned with the matter of law--because of precedent--than was true in outer space.

People in this country--because we are a young nation, because we are so full of enthusiasm to make progress--seldom look backward. As a consequence, we have less appreciation of history than do our foreign neighbors. Nevertheless, it is here that we should take a look backwards at some of the basic principles that will underlie the spirit of this enterprise for the future. We are engaged in a program of scientific research; we will be engaged in a program of geographical exploration; we must be engaged also in legal research that is underway today. It seems to me that indeed we have a frontier of maritime law that will be just as challenging, just as inviting, just as exciting to enter as any physical frontier. Those of us in Washington with responsibilities in this area look to you at this conference to provide us with help, with insights as to what the issues are; to separate the signal from the noise level; to help us understand the pros and cons of the alternatives; and to help us make some wise decisions for the future.

Again, my congratulations to the officers and founders of this symposium. I regret very much that I cannot stay through all of it but you have a very avid reader. Thank you.

Lewis M. Alexander: Executive Director, Law of the Sea Institute

In planning these conferences we have tried to establish some form of continuity from one annual conference to the next. Last year's theme dealt with zones of offshore control and with the general question of what has happened since the 1958 Geneva Convention. We felt in planning last year's conference that there had really been little work done in recent years on the law of the sea and how it had evolved since 1958, so a lot of our effort was directed to bringing up-to-date the things that had transpired over the last eight or nine years. This year's conference, however, looks ahead. Given the situation we are now in as regards the law of the sea, what happens next? What can we look forward to so far as the future of the sea's resources is concerned?

In these opening remarks I would like to very briefly review where we are now with respect to the Geneva Conventions and the law of the sea. As you probably know all four of the Conventions which were adopted at Geneva are now in effect. All four have been ratified by the United States. Yet less than fifty states out of a possible total of over 130 have seen fit to ratify even one of the four Conventions and less than half of these fifty have ratified all four of them. Given this situation, to what extent in fact do the Geneva Conventions represent the international law of the sea for all countries?

The Conventions were adopted nine years ago and some of their articles may soon be outdated; they certainly may be outdated before a majority of the countries of the world ratify them. This is something we talked about last year, and I am sure the subject will come up again this year. For the United States, and indeed for any particular state, there seems to be certain alternative actions which might be taken with respect to these Geneva Articles.

First, the articles may be looked upon as embodying the international law of the sea to which all states are expected to adhere, regardless of whether or not they have officially ratified the Conventions. This, I believe, is the position taken by the United States. Within the framework of certain articles, however, there may be broad interpretations, as for example in the case of the definition of limits of the continental shelf or of the exclusive fisheries rights of coastal states out to twelve miles from shore. Such interpretations by one state may prove unacceptable to other states.

A coastal nation may seek revision of one or more of the articles as soon as the initial five-year effective period is over. This was mentioned last year by Mr. Northcutt Ely in connection with possible modifications of the Convention on the Continental Shelf in 1969, five years after the Convention had come into effect. Or, indeed, the coastal state may choose to ignore one or more of the articles, on the grounds that it no longer is relevant in the light of changing conditions. There were also a number of matters which were not covered by the Conventions, as for example the case of straight baselines in archipelagos, the definitions of historic bays, or the principles of abstention. In these situations a state may feel itself compelled to fix policy both as to what controls it will seek in the sea and what recognitions it will give to other countries' claims. And finally, through bilateral or multilateral agreements a coastal state may establish specialized forms of control in the sea which may or may not be viewed as binding on all other countries.

These summer conferences are designed to explore alternative courses of action in the seas for the United States, for individual foreign states, and for the community of nations as a whole. In a world which becomes increasingly fragmented politically the task of achieving consensus of opinion on the law of the sea becomes increasingly difficult; but the alternative is chaos. Somehow a rational use of the sea and its resources must be affected. I hope in the next few days we may move a step further towards this goal of rational use.

William T. Burke: Professor of Law, Ohio State University, Columbus, Ohio, and member of the Executive Committee, Law of the Sea Institute

We have just heard a brief description of what transpired here a year ago at the initial meeting and, as was noted, through circumstances beyond our control, we were unable to have the Proceedings in your hands before this second session. We have also heard an authoritative account of the efforts now underway in the federal government to place the national oceanographic effort on a firmer and expanding foundation. Perhaps there is some danger of repetition.

I would like to direct your attention to the place this meeting and others resembling it has in the context of both the federal effort and other efforts on a state, corporate, industry, and private level. What we are concerned with here in talking about the future of the sea's resources are the ways in which social problems of all kinds, not merely legal, can be surmounted in order to make productive use and wise distribution of the sea's resources. Many of these problems are only dimly perceived, and some may not be above the horizon at all. Whatever the category, however, the key word, in my opinion, in approaching the subject is anticipation. Anticipation not of benefits, although this is the hoped-for outcome without which our concerns would be merely casual, but anticipation of new and imaginative ways in which problem-solving can be made more effective for the benefit of all. However hoary and familiar some ocean-centered controversies may be, the challenge is still to seek out new proposals for resolving them. Indeed, the more barnacle-encrusted the problems the greater the challenge. The questions are what techniques, devices, or approaches have been entirely omitted in the past and what of these have been neglected, or slighted, or given insufficient attention? What resources of data, skill, substantive discipline and procedural technique could now be tapped for aiding in the establishment of policy for these old and new ocean problems. What questions have not been asked, let alone answered? What institutions, governmental or private, ought to be created not only for promoting effective use of the sea but for performing all these tasks as problems occur and recur through time.

Now the fact that these and other questions are under active consideration at a governmental level certainly does not mean that they are beyond consideration in gatherings of this kind. At one time these conferences might have

been regarded, and justly so, as "talkathons" for the benefit of those attending. However this may have been, it is no longer true, at least to the extent that our efforts here are aimed at the generation of ideas, proposals, and suggestions relevant to those whose responsibility--whether in government or outside the government--is the task of making recommendations or making decisions about the future of ocean development. It might not be inappropriate to systematize those questions I have just put in a little more relevant fashion. The problem is what kinds of questions are relevant if we seek to improve our social problem-solving capabilities in the development of the ocean, and the following comments are intended to be briefly suggestive of the various tasks confronting us.

First, in regard to the many uses of the sea, what are the objectives at stake (using objectives here in the sense of our long-run, intermediate, and short-run preferences) for the events which we wish to have occur? I think we ought to place a great deal of emphasis on the three categories--long-run, intermediate, and short-run, and especially long-run interests. Clarification of goals ought to be sought for promoting long-run interests, with intermediate and short-run goals carefully designed to achieve that end. Now clarification of these objectives may obviously proceed on many levels. But I think it is also obvious that we wish to become as detailed about these objectives as these situations require. One function of a meeting of this kind is to contribute to this process through the debates and the discussions that are provoked by the papers selected for presentation here. As noted above, a special concern is to enlist or to attract the attention of all those whose qualifications and skills may contribute to more detailed specification of the goals which we seek or ought to seek. And I think it ought to be emphasized that the designation "Law of the Sea Institute" is not intended to suggest that lawyers are the only ones who can contribute.

Secondly, we are interested in describing the choices made in the past with respect to recurring problems; for lawyers especially the concern is for choices which are supported by severe sanctions. What we wish to do here is to identify trends in the decisions which have been made in earlier times. Although this is essentially descriptive in nature, the task is not devoid of creativity since discussing relationships in past decisions, and the outcomes thereof, may contribute to wise decisions in the future.

Third, and of special significance in the present context, is the identification of conditions affecting these choices. It is commonplace to note that decisions about what is permissible or acceptable conduct reflect the social process as a whole, and the task of relating conditions of the social process to past decisions is extremely difficult; yet it may offer helpful guides in the evolution of future wise choices.

Fourth, the projection of future conditions relevant to choice is a task to which many persons with the widest variation in background, interest, skill, and training must be recruited. Obviously, in focussing on the future of the sea's resources we are concerned with projecting ocean developments through time. The increasing intensity of our interest in the sea, and the wider awareness of potential benefits and problems, suggest a need for disciplined, systematic projections, utilizing every avenue for acquiring relevant data. The dimensions of this task are only gradually being understood, but with meetings such as this and others progress is being made in enlisting the specialized knowledge and skills required. I think it is especially important to emphasize that the nature of this task is interdisciplinary in content.

The last and probably the most difficult element of problem-solving is the invention of alternatives in policy for realizing our objectives. I doubt there is any need to emphasize the difficulties and the challenge of this task. And again, success in this phase of problem-solving is the real test of overall achievement. One of the present aims here is to contribute to the process of creating realistic and desirable alternatives for ocean development. I hope that somewhere within this framework much of what we do in the next four days will fall.

Francis T. Christy, Jr.: Staff, Resources for the Future, Inc., Washington, D.C., and member of the Executive Committee, Law of the Sea Institute

I feel as if this morning's program has some of the characteristics of a common property resource, and that I am contributing to the dissipation of the economic rent by being redundant and saying some of the things that were said before. I think, however, that the things that have been said before are very important and should be repeated or at least expressed in a different sense.

The idea for the conference over these next four days is in keeping with what Dr. Wenk said earlier. We want to begin to get some better understanding of the pressures that are at work on the ocean--the economic, political, and social pressures--to identify the vested interests, both present and future. We will have to understand who is going to be using the sea and how they are going to use it in order to work toward the establishment of some viable regimes and sets of rules.

A second aspect is that we must examine carefully the kinds of rules and regimes that are required to accommodate the pressures; we must determine who needs what in order to operate efficiently within the high seas and on the sea's bottom. Then a third aspect is to go into the present kinds of regimes and rules that we have and analyze these from the point of view of the requirements that will be placed upon them, and see to what extent they will meet these requirements and to what extent they will not. And the final aspect is to go into the discussion of the new kinds of regimes which might be established.

If you look at the program I think you will see that this is the way we have tried to work it out. This afternoon's papers are dealing with the fisheries and the future growth of world fisheries, the problems of enforcement, the questions of overcapitalization and what kinds of developments will be taking place. Tomorrow morning we touch upon

some of the other non-fishery uses of the ocean--the minerals on the sea floor, ocean science, military needs, oil and gas--this is to set the framework in terms of the needs for rules and rights. And tomorrow afternoon you will notice we turn to the present kinds of arrangements with a discussion of these and how they might meet the pressures that have been put upon them. Wednesday morning in the discussion of conflicts we will bring together the different uses of the sea; on Wednesday afternoon some suggestions on alternative regimes; and on Thursday we hope to again have suggestions for alternative regimes with a full discussion on various aspects of this subject.

As has been mentioned, the importance of this is to stimulate as much constructive and open discussion as possible. No one has the answers at the moment and we need to get as much exchange of ideas and research on these ideas as possible. In this connection I might mention that my own organization, Resources for the Future, of which some of you may not know, is a small group in Washington financed entirely by the Ford Foundation, undertaking economic research on natural resources problems. We are anticipating the development of a program for marine resources. We hope to develop a small staff and look forward to some modest financing for support of research projects. Your ideas will be very welcome. One final note; I have played the role of Pope Alexander VI and have divided up the ocean as a matter of illustration. This is visible on a map in a room across the hall. There are some interesting aspects of this division and you are all welcome to take pot shots at it.

EDITOR'S NOTE: A fold-out copy of Dr. Christy's map is inserted in the back cover of this volume. Additional copies may be obtained for $1.00 each from the Law of the Sea Institute, University of Rhode Island, Kingston, Rhode Island 02881.

SOME OBSERVATIONS ON THE FUTURE GROWTH OF WORLD FISHERIES AND THE NATURE OF THE CONSERVATION PROBLEM

Roy I. Jackson
Assistant Director-General (Fisheries)
Food and Agriculture Organization of the United Nations

My subject--The Future Growth of World Fisheries and the Nature of the Conservation Problem--is both too large and too rapidly changing to be dealt with comprehensively by me, or perhaps by any single person. It could well be the theme of one or more conferences. I will content myself with making some observations on the subject, mentioning first present and future catches and their distribution, and then discussing some aspects of the problems of conservation as I see them.

THE CATCH

It is a cause for some satisfaction to those engaged in fishery development that the world catch has been increasing at an average rate of 7 or 8 per cent annually in the two post-war decades. We often observe that fish is one of the few major sources of food whose production is outstripping the rate of human population growth. This is true, though one may question whether fisheries make a "major" contribution to world food supplies today.

A few days ago I received a first estimate of the world catch for 1966. It is too early for official figures, but preliminary reports plus estimates indicate that the world catch will reach an all-time high of approximately 56 million metric tons of marine and fresh-water fish, including crustaceans, molluscs, and other marine invertebrates. This estimate excludes whales, seals, and plants. The increase over 1965 is about 6 per cent, the 1965 catch being estimated at 53 million tons.

Some simple arithmetic shows that the marine portion of the catch for 1966, if spread over the whole of the world ocean, amounts to about 1.2 pounds of fish per surface acre of ocean per year. After a suitable pause to let that statistic be scrutinized, one then points out that the average acre of ocean is 12,000 feet deep.

Such a figure can mislead one to a lot of speculation, especially if it is compared with results obtained from intensive cultivation of fish in ponds where production of several thousands of pounds per acre per year can be obtained with present techniques utilizing artificial feeding. But I suggest that after all due allowance for oceanic deserts, for non-utilization of most organisms, for lack of knowledge of what is actually there, such figures indicate that an overwhelming proportion of the seas production of living material, animal as well as plant, is not utilized by man.

What is more relevant certainly is that over most of the open oceans we do not really know quantitatively what forms are present, we do not know how to catch them, and we could not afford to catch them if we knew how, which is another way of saying that we do not want them very badly.

A number of students of the matter have come up with estimates of 200 million tons or thereabouts as the amount of fish we may expect to take from the ocean in the future. I have no quarrel with this figure as an estimate of what may be taken under a particular set of assumptions, particularly concerning what species and sizes of fish and other animals can be economically harvested--but other, quite reasonable assumptions can give quite different estimates.

It seems certain that increased catches of this order of magnitude will require dramatic additional changes in an industry that is already in the process of rapid change. A number of marine fishery scientists have noted that the catches from most of the major stocks in the Northern Atlantic and Pacific of desired species cannot be significantly increased. From several of these stocks an average catch not very different from the present could be taken with considerably less fishing. The last major cod stock in the North Atlantic, the cod off Labrador, is now heavily fished. There are grounds for concern about the level of exploitation of the trawlable stocks off West Africa and off Southwest Africa and South Africa.

While some of these fears may be premature and while there is no doubt that new grounds will be found and that new stocks may be exploited on known grounds--it may be said that the present rate of increase of catch cannot be maintained for many years on the types of fish now preferred (cod, hake, tuna, bream, etc.). Increased catches in the future will be taken from the smaller schooling species, the herrings, anchovetas, and also from others little utilized at present. Such forms even today account for nearly half of the marine catch and have supported most of the increase in world catch in the last decade or more. Capturing and marketing fish of these species offers both advantages and disadvantages. They concentrate naturally, which is essential for present methods of harvesting. They are low in the food-chain and thus can graze directly or one step removed on the plant life of the sea.

At present most of the small fishes are used for industrial purposes--the production of meal to be used as a component in the feeding of chickens and other animals. There is nothing wrong with such use--as Dr. Chapman has recently said, a chicken on the farm is probably a more efficient device for conversion of low-value protein material into high value food than a tuna or a salmon. Also at present the practical choice is between not using the Peruvian anchoveta at all, and using it for animal feeding. All of us would agree that given the shortage of protein in many parts of the world affecting perhaps two-thirds of mankind, it is desirable that fish protein be fed directly to people. But mankind has shown little ability to date to solve the problems of product development, marketing, and economics that are involved.

Although the use of the small fish of the sea must be expanded within narrow limits of cost and profit, the steady increase of world population, the advancing technologies of capture and product preparation, and the spreading awareness of the importance of animal protein in human diet create a situation in which this food source should meet increasing demand--perhaps at some expense to the abundance of some of the stocks of the sea's carnivores--the tunas,

salmons, and others for which these small fishes are a major food supply. There will be many problems in catching, processing, and marketing, but this paper will be concerned principally with the problems directly concerned with the resource and its management.

Perhaps one can conclude, at least for purposes of argument, that most of the increased catches of marine fish in the future will come from the smaller, more abundant, less desired and therefore less valuable species. One may also conclude that, since the fish of the sea are hunted and not husbanded, the level and the stability of the catch will depend, on the one hand, on the great improvement of hunting techniques and, on the other hand, on the successful development and enforcement of the game laws--the conservation system--to ensure that the potential resources are not wasted by too much, or the wrong kind of fishing.

THE NATURE OF THE CONSERVATION PROBLEM

The problem of fisheries conservation in the broad sense, consists of two interacting complexes or galaxies of problems; neither of which we very well understand or control.

The first group of problems are those involving primarily knowledge: Of what kinds of fish there are, how many, how they react to being fished (that is, how many can be caught), how they interrelate with each other, how different years and seasons affect their abundance.

The second group of problems which forms part of a system of fisheries conservation or management begins with technology and ends with international politics, with elements of science, economics, national and international law, and sociology as other important components.

Perhaps we can begin with an approximation of where fish are taken in the sea. Data on this factor are sadly lacking and indeed greatly improved catch and effort statistics become more and more essential as we approach production limits of more and more stocks. (I shall say more about this in a moment.) Members of the staff of the Department of Fisheries of FAO, in response to my question have suggested that a rough grouping of location of capture of the world's catch of 47 million tons of marine animals in 1965 might be as follows:

(a) coastal, occurring close inshore along the coasts of one country (molluscs, some crustaceans, etc.). . . . . 2-1/2 million tons

(b) offshore, occurring off the coast of only one country (not too migratory fish, living off the coast of a large country). . . . . 4 million tons

(c) offshore, occurring, at different times, off the coasts of several countries (demersal, and most pelagic fish other than (b)) . . . . . .35 million tons

(d) oceanic, occurring at some time outside even the widest limits (whales, tuna, salmon, some herring) . . . . . 5-1/2 million tons

Note: Coastal in this sense means close inshore in depths up to around 10 fathoms; offshore includes the waters beyond the coastal zone up to, roughly, the limits of the continental shelf, say 200 fathoms.

This tabulation underestimates the economic contribution of oceanic fish, since many of them attract very high prices.

Clearly, the question of whether fish from the same biological population unit may be captured within one or more than one national jurisdiction or in some combination with locations of capture on the high seas (i.e., outside of national jurisdiction) will have much effect both on the nature of the conservation problem and on its solution.

As some criteria for judging whether a program of fishery management (conservation) is being successful, the following three points may be considered:

(1) Does it ensure that the effect of fishing--the fishing mortality--on a heavily fished stock does not increase so much as to so reduce the abundance of the stock that the yield from it is substantially reduced.

(2) Does it permit the allowable amount of fishing to be carried out efficiently.

(3) Does it permit the full development of fisheries on un- or under-exploited stocks in the same waters, and encourage measures of resource protection and improvement.

This is not, however, a comprehensive list of requirements for successful management.

Before beginning a discussion of some of the broader aspects of fisheries conservation in the future I should like to draw special attention to some of the fundamental requirements of any conservation measures--requirements that become more important as the level of exploitation increases and as the fishing power, mobility and versatility of vessels and gear also increases. There is first of all the need for improved statistics of catch and effort--almost all the knowledge a scientist has of a stock of fish in the quantitative sense comes from calculations based on commercial catch and effort statistics and from size and growth rate information based on catch samples. FAO obtains and compiles and distributes official statistics from our member countries and from other sources. All who use these data are generous in pointing out both their value and their shortcomings and we agree.

To supplement and improve on the estimates of population size and response to the fishery calculated from catch and effort statistics, it is desirable to develop methods of rapid and direct assessment of abundance of major stocks. In my view the range, mobility, speed, and analytical power of the fisheries scientists are falling steadily behind the fleets and the industries they serve. There is need not only for rapid assessment techniques but for a new order of magnitude in research. The world supply of fishery research workers is small, inadequate to meet demands and tends to be concentrated in a handful of countries. The fishing vessels are moving further, faster, the gear changes are so rapid that the reference base for population estimates requires constant changes. As I look around this room I see a number of us who are in competition for scientific manpower. All of us suffer from lack of funds to keep essential activities going--all of us can define problem areas of great importance that we cannot enter.

Attempts to solve most management problems have foundered on the question of limitation of effort and the magnitude of difficulties that develop where entry is not controlled. This question is compounded in the multi-national fisheries since there must be complete, or almost complete, agreement among all the countries concerned to restrict their effort, and even then such agreement can be frustrated by new countries entering the fishery.

We must do these things bearing always in mind that we desire a continuous and significant expansion in total catch--conservation measures for particular stocks should not inhibit the exploration and utilization of new fisheries. There are several examples where such inhibition has in fact occurred.

The status of national jurisdiction over fisheries has changed and continues to change rapidly since 1958; I have some tables which show the current jurisdictions as far as our world-wide enquiry has brought responses. A summary based on data from a year ago shows 15 nations claiming 3 miles; 10 claiming 3 to 10 miles; 49 claiming 12 miles and 17 nations claiming from 12 miles upward to 200. (Twenty-three United Nations members have no sea coasts.) Shigeru Oda has recently said that Japan is the only real fishing state that still belongs to the three-mile group.

At this point it should be stressed that FAO takes no position with respect to the extent of the territorial sea, the contiguous zone, or the extent of jurisdiction over fisheries. Our members cover the full range of positions on these matters. Rather, our interest is in the advancing of fisheries development, nationally and internationally, the increasing of production on a sustainable basis. We are engaged in establishing systems and bodies for international cooperation in fisheries development. We are interested in a stable situation with respect to fishing limits in order that it can be known for a sufficient period ahead so that the investment and increased effort required to give increased production can take place.

We do not advocate any particular limit, but we must be against underfishing as well as overfishing as long as more protein food is needed.

It is necessary, in many parts of the seas, to coordinate national and international research programs and conservation measures. To an increasing extent this needs to be done not only on a coastal basis, but, as fish and fishermen are shown to wander farther afield, on a multi-national coastal and non-coastal basis. Although I am inclined to think that extreme distant water fishing, of the kind for example that gives South Korea the largest high seas tuna fleet in the Atlantic, may phase out when coastal countries begin real competition--there remain many areas where fishermen are congregating from all parts of the globe and even rudimentary mechanisms for international cooperation are lacking.

FAO, with the constant policy advice and guidance of its thirty-member nations Committee on Fisheries (COFI) has moved rapidly in the last several years to fill some of the more important gaps in the geographic and species map of world fisheries requiring international cooperation. A year ago, under FAO good offices an Atlantic Tuna Convention was prepared in Rio de Janeiro, covering all species of tuna and tuna-like fishes of the Atlantic Ocean and its neighboring seas. The convention is open-ended, to all members of FAO, the UN and any of its specialized agencies. It is open now for ratification or adherence. Seven ratifications or adherences are required--to date we hold one, that of the United States.[1] I hope that within a year the first meeting of this body can be held.

Last week the Council of FAO, an executive body of member nations, completed action that originated with COFI, to establish an international fisheries advisory body for the Indian Ocean and another for the multi-national fisheries of the waters of the Eastern Central Atlantic off West Africa north of the mouth of the Congo River. This body will replace the non-operative FAO-sponsored Regional Fisheries Commission for West Africa, which was limited in membership to states holding territory along the coast and which failed to convene a meeting because of political differences.

South of the mouth of the Congo, in the Southeast Atlantic, the Secretariat of FAO, on request of a member state and with guidance from COFI, will draft a treaty to cover the fisheries of the sea area off South Africa and Southwest Africa where fifteen or more nations are engaged in the hake and other fisheries. After consultations with interested states, FAO will convene a conference of plenipotentiaries to prepare a final version and open it for signature. In this case, as in the case of the Atlantic Tuna Convention, the new body is not to be set up under the FAO Constitution, but will be an independent commission. Naturally we will cooperate and assist to the extent possible, as we attempt to do with all the regional bodies. The membership of COFI is so representative and so many senior fisheries officers have taken part in its two meetings to date that we believe we can continue to supplement and not interfere with existing regional bodies.

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[1] By November 1, 1967, two more adherences or ratifications had been recorded, from Japan and South Africa.

One of the major conservation problems of the future lies in making the international regional fishery bodies more effective and, in some cases, more flexible. It is unfortunate that one of the earliest and broadest of the international bodies, the International Whaling Commission, and one with perhaps the simplest scientific problem, is concerned with a group of species with almost no capacity to compensate, except after many years, for the effects of overfishing. This example gives little encouragement to developing coastal states to put the welfare of fisheries off their shores in the hands of similar bodies.

But much worse--to my mind--is the fact that the mobility range and intensity of today's fishery and the rapidity with which stocks come under heavy exploitation is leaving the scientist less and less able to obtain the data from the commercial fisheries that constitute his principal research tool. There is need for much greater support particularly for the regional international bodies (I find the continued inadequate support of the IATTC both inexcusable and depressing). We are exploring means of international development fund financing of the research programs of regional international fishery bodies where other forms of support are inadequate.

Mr. Chairman, I have no summary for this collection of observations--I have tended to emphasize the problems and ignored the positive aspects of fishery development--fish husbandry, the enhancement of fresh water fisheries, the exciting development of new techniques of fishing and new species to be exploited, all give promise of growth in fisheries that will take place in spite of the problems that concern us and probably in directions that none of us can predict.

DISCUSSION

It was pointed out that while FAO has no policy on what the limit to national jurisdiction over fisheries ought to be, it is vitally concerned with the effects of national limits on utilization, conservation systems, overfishing or underfishing, and on kinds of regimes necessary for the rational use of the resources. FAO has a constitutional obligation to augment food supply, better the conditions of world populations, and insure better nutrition.

IMPACT OF DISTANT WATER ON COASTAL FISHERIES

John Wedin
Staff
U.S. Senate Commerce Committee

The specific subject of this paper would seem to be particularly important in relation to the theme of the 1967 Law of the Sea Institute Conference--"The Future of the Sea's Resources." There can be little doubt that most of the conflict between nations has stemmed from impact and conflict of distant water fleets on coastal fisheries and fishermen.

It would seem proper to assume that we are talking about the world ocean rather than the adjacent or even super-adjacent waters where U.S. flag vessels now operate or may operate, or where there might be present or future American interest. Any discussion of ocean harvest and the laws providing an orderly regime is increasingly becoming a matter of focusing national and international interest in light of growing world hunger problems.

In the limited time available on such a broad subject, it appears that a treatment, for the most part, of United States interest in the area will be broad enough to allow discussion of most of the problems which face both fishing and coastal states in the consideration of the future of the resources of the world oceans.

Unfortunately, it has been difficult to remain within the strict context of the assigned topic, and I must ask not only the indulgence of those present for frequent departures but, more important, the understanding of other panel speakers for occasional crossing of topic boundaries.

Competition "Within Gears"

When we use the term impact we are probably thinking of the resultant conflict and competition in the broadest sense. First, it might be well to classify gear competition into specific categories: competition "within gears" and competition "between gears."

Competition "within gears" occurs normally when two or more nations are competing for resources in a common area and the exploitation is accomplished with the same or similar types of gear. An example might be the problem which existed off the coast of the State of Washington during 1966. In this instance both United States and Soviet vessels were exploiting the hake resources adjacent to the Washington coast. Gear competition and minor conflict resulted due to the large disparity between the towing power and fleet size of the two nations. Essentially, it appeared that the large Soviet fleet, through the use of its greater towing power, was displacing the smaller, less powerful American vessels. A somewhat similar situation developed in recent years in the mid-Atlantic bight, again between Soviet and United States vessels, where the red hake resource has been taken in increasing quantities by the Soviet fleet, while the American catch has declined in almost direct proportion. Here, however, the situation seems to stem more from the Soviets capturing the resource prior to its inshore entry to the American fleets.

Another example of competition within gear--and perhaps a classic--is that of the Soviet-Japanese set net fisheries in the Bering Sea. Here again both nations are exploiting a common resource in competition with each other and both nations are under restriction concerning the total yield that they might achieve; that is, the quota as established in bilateral negotiations between Japan, the United States, and the Soviet Union. As a result of the rather restrictive productive grounds and the desire to achieve their share of the available king crab, each nation apparently oversaturates the area with gear. In this instance we have competition for space on the productive grounds and there is a resulting interference factor that diminishes the fishing effectiveness of all the nets set; that is, there is too much gear for the number of crabs. The result is the catch per set net drops.

In addition, there is an apparent loss of crabs as both nations may set more gear than they can effectively handle in what might be considered a proper time interval. In other words, to insure their share of the catch they oversaturate the grounds with gear, thus insuring that the net occupies a certain effective area although they may not be able to haul the net in the proper time span. Thus there is a higher loss of crabs due to death in the nets and fallout than would normally occur. In this instance gear competition results in waste of the resource, reduction in efficiency of the gear, and overall economic loss to both parties concerned.

The projected solution, of course, is the separation of areas for each nation for exclusive fishing in any one year.

Competition "within gear" basically represents prior occupancy and hence eliminates the competitor. This is true with pots, setlines, and similar equipment. Essentially the first man or vessels to an area can occupy all the desirable fishing locations and thus preempt competition. This can occur within a fishing fleet or between the fishing fleets of two nations. All of these instances refer to competition "within gear" directed toward exploiting the same species.

Competition "Between Gears"

Probably the most prevalent type of gear conflict is competition between different types of fishing gear. Typical is the conflict between trap and setline fishermen and the so-called mobile gears, such as trawls. In this instance the setline or trap fisherman, in theory, preempts an area to the mobile gear when a ground is saturated. In reality, then, it is a competition for fishing space that creates the problem.

Both the trawler and the longliner want to fish the same grounds but perhaps for different objectives. The trawler may be exploiting ocean perch, pollock, or cod, while the longliner may be exploiting halibut and crab,

respectively. The problem is generated by nature which allows both species or a series of desirable species to occupy the same geographic area during the same time span. In this instance there may be no real competition for resources between nations, as the objectives are mutually exclusive. The problem reverts, then, to one of a real distribution of gears in time, and how can nations effectively exploit or achieve their objectives without preempting the other or resulting in loss of gear to one or both nations involved?

There are no easy answers here, but there are a number of steps that have been taken to minimize losses between gears. In those instances where the resources are not highly mobile, it is possible to minimize gear conflict by separating the time spans of fishing. This was done in the halibut trawl problem in the Gulf of Alaska; that is, during the period of intense longline fishing on Albatross and Portlock Banks the region was closed to trawling for several weeks. Another solution, of course, is effective marking of the gear and laying the gear out in certain patterns to minimize conflict with trawl operators.

Finally, exclusive areas can be set up for pot or trawl operations as has been done in the king crab agreement in the Bering Sea. Competition between gear may also be the product of different gears being used to exploit the same species. There are numerous examples of this, where gillnets, trawls, and even purse seiners have been used to harvest the same species. The real problem here, however, cannot be differentiated between the types of things described above, and basic to the problem is utilization of set gear which preempts mobile gears from some areas.

Recent U.S. Agreements

In order to ascertain the United States intent and direction in the area of fishing impact and resultant conflict, it would seem proper that we examine in a general way some of the agreements which we have recently reached, or attempted to reach, with some of the nations whose fisheries are common with ours, on our coast or theirs.

Beginning about last July, a delegation of United States experts journeyed to the Soviet Union to discuss some of the problems arising from the presence of Russian trawlers off the coasts of the United States. Significantly enough, the Soviet Union refused to accept language to this effect, noting that the conflict was a mutual result from the presence of both coastal and distant water fleets on the same ground.

Although this first meeting was prior to the enactment in Congress of the nine-mile fishery zone extension legislation, the question was in the minds of those present, and in ensuing negotiations became very much the center of discussions.

It is true, of course, that in many cases we were thinking more of "who gets the fish," as some prefer to label it, than the issues as publicly expressed. But regardless of underlying motive, the question of rules and rights, and the impact of distant fleets on coastal fleets and fisheries have been the agenda items.

Following the earlier meeting in Moscow, we met again in November with the Soviets, this time to attempt to agree as to what the problems were and what possible solutions might be used. Later, in Washington, D.C., an agreement was reached covering the Pacific problems. Earlier this month we continued a meeting with the Soviets in Boston, just prior to the annual meetings of the International Convention for the Northwest Atlantic Fisheries, in an effort to solve some of the problems of concern in the mid-Atlantic bight area.

Similar meetings were inaugurated with Japan during this period, and earlier this year an agreement was reached in Tokyo with that nation spelling out individual responsibilities and providing, hopefully, some kind of balance between privileges inside our newly-adopted nine-mile fishery zone, as well as some restrictions outside that area. With both of these nations there was no reciprocity as far as limit privileges were concerned, for no American vessels are fishing off either the Japanese or Soviet coasts.

Continuing discussions with Canada, however, are heavily concerned with the question of reciprocity, for both nations are engaged in fisheries off each others coasts. This was partially true in the recent ten-day session with Mexico in Washington, D.C., but Mexico tended to reject our suggestions, proclaiming that her fisheries off our coasts were minimal. In the Mexican agreement, however, we might contend that reciprocity was present, for the element of the huge United States market for Mexican shrimp was an ever-present consideration. The same situation exists in our discussions with Canada.

Agreement vs. Precedent

In each of these discussions, whether recorded officially or not, there has been a background concern on the part of those participating toward the possibility of precedents established in an agreement, and the resultant effect upon the respective nation's role in fisheries off other shores. With the United States, our principal concern has been for our distant water fleets for tuna and shrimp, although with Canada the bottom fisheries we enjoy off their shores are going to be a matter of concern. The level or degree of fear as to precedent has not been equal, obviously, for such nations as Japan and the Soviet Union, who fish off a major portion of the world's coastline, have much more to lose, or gain, by the kind of agreement established. The United States, despite its declining production in the scale of world fishery production, still ranks as a leader in the area of international conduct and world fisheries organization affairs participation, and an agreement here is vital to a fishing nation as a means of proper precedent in other areas.

What we must recognize is that the impact of the distant water fleets on the coastal fisheries--the subject of this paper--may well be the key to the future of the sea's resources, the theme of this conference. For how we deal with this problem as a leading world maritime power cannot help but have strong effect on other nations, and may well constitute the trend of world agreement in the future.

Our Lack of Knowledge

First, logically, conservation must be considered when we discuss agreements, and this is the subject of a separate paper at the present forum. Certainly, conservation and maximum sustainable yield have been high in consideration in the agreements thus far negotiated by the United States. There have been times, and there will be occasions in the future, when the use of the word "conservation" will be practically interpreted and applied in an economic role, but the value of the term will continue to cause its use in official agreement and treaty language.

Regardless of relative national political strengths, domestic pressure, or even justice, the accepted basis for determination of dispute rests upon adequate scientific data as to the extent of the stocks and potential sustainable yield. But all too often we have found that we know less about our adjacent resources than those who come from afar to exploit them. This is not always true but it has occurred often enough to be a matter of concern to this basic question. It is extremely difficult to discuss any fishery problem across the negotiating table without facts--scientifically acceptable data--particularly when the area in question is adjacent to our shores. Yet this is precisely the position in which we have found ourselves in relation to negotiations with the Soviet Union and Japan.

Divided United States Interest

In any discussion of distant water impact we must look to our own national fishery interest, and herein lies a problem for we are a nation of divided interest. This is not unusual, for a good many of the fishing nations of the world also have coastal fisheries and appropriate interests. Not so many, however, have such evenly balanced interests as we do between our distant and coastal fisheries. As a result--and I would emphasize that the record will show numerous individual instances of one faction sacrificing to the benefit of the other--we have had difficulty in achieving agreement as to what our national posture should be. On the one hand, our coastal fishermen, to a large degree, favor a 200-mile zone, perhaps jurisdiction to the edge of the continental shelf, or a combination of both. On the other, the distant water fishermen would rather retain the traditional three-mile territorial sea as the outward boundary for fisheries. As to agreements, the coastal fishermen--assuming the understandings reached are potentially beneficial--would like a short term; the distant water interests, with the same assumption, would prefer them to be of a longer duration.

Out of this divided interest some cloudy concepts are merging which do not necessarily reflect the desire of either side, proposals which appear to come as a best alternative to the circumstances. The recently-passed nine-mile fishery zone law, for example, was not the predominant choice of the coastal fishery interests, and though their support was a vital factor to its passage, they have generally made it clear that our present twelve-mile jurisdiction for fisheries should be regarded only as a step toward broader exclusive claims of something like 200 miles.

Some factions within the distant water community appear today to be seeking a second-best position also, recognizing world trends as they are, and are talking in terms of United Nations control of the high seas, thus preventing further jurisdictional claims. Needless to say, these relative positions are the result of the subject of this paper, "The Impact of Distant Water on Coastal Fisheries," and it is well to recognize that the whole question is a fluid one and whatever final judgment is made, it may not be based on the Utopian desire of either camp.

Interpretation of Existing Law

Inherent in the question of potential impact and conflict in this question of distant water and coastal fisheries must be the resolution of such problems as base lines, base periods, and phase outs. Few of these were totally resolved in the discussions or Conventions at Geneva in 1958 and 1960. It is true that a goodly part of international marine law was codified or adopted in these two historic conferences, but even in the areas of solid agreement there are continuing problems of interpretation. "Innocent passage" is a timely example, and the mid-East crisis is an apt demonstration of the utilization of a particular interpretation for temporary advantage.

Within the fisheries community of the United States, of course, we have not had this degree of interpretation conflict, but rather the stance of the respective interests. We have avoided a major confrontation on some of these questions by choosing the course of bilateral agreements of relatively short duration, and in none of these cases have we sought to either define what traditional rights are or how long they should endure. We have not sought duplication but mere balance, although we have expressed a desire for consistency of precedent.

There are those who claim that the United States has avoided the basic issue of our fishery problems, has dodged meeting the real conflicts, and merely put them off for disposition by some ensuing generation. Despite the obvious motive, however, it would appear that we have taken the position that each of the considerations has been individual and peculiar, and thereby insolvable with any universal treatment as sought in Geneva in 1958 and 1960.

But in each of these agreements and discussions, the United States has consistently taken positions calculated to inflict the least possible damage on distant water fisheries, or, if that segment was the order of discussion, equal consideration to our own important coastal fishery interests.

The Question of Relative Efficiency

From the earliest entry of foreign vessels off our shores we have heard the consistent cry of the huge, modern, and efficient foreign ships of the so-called "invaders," and the resultant damage to our fisheries resources and to the economy of our "decadent" fishing fleets. The American fishing fleet has been universally branded as too small in number and individual size and hopelessly obsolete. It would be improper to deny these charges in the instance of our domestic vessels, but in the area of pure economic efficiency there is a danger in such broad and universal reference, for many of our vessels and fleets are among the highest unit producers in the world.

First of all, there seems to be some kind of misconception in the relationship between respective size of vessel and efficiency. Granted, if we are to fish off distant shores, we would use larger vessels than we now operate relatively close to shore. By the same token, however, these so-called efficient foreign operators do not use their motherships or huge stern trawlers in their own coastal fisheries, for there are adjacent ports, anchorages, facilities and markets close by.

The Pacific Northwest trawl fleet, for example, with vessels in the sixty to eighty foot category, when given a virtually unlimited market a few years ago clearly established their fitness and ability to harvest record quantities on a catch-per-man basis, and with a man-share and owner return more than comparable to shoreside employment or investment.

A more recent example is the record being established by the new ten-boat hake fleet out of Grays Harbor on the Washington coast, where some of the vessels have passed the million pound mark in individual production in just over two weeks fishing. These vessels were not built for hake, but they have proven beyond doubt that they are neither antiquated or obsolete.

This is not to intimate that there is no need for upgrading or modernizing our fishing fleets, or that we not look to larger vessels. It is merely a statement of opposition to the general statements which universally condemn the American fishing vessels, and further propose that we should duplicate the foreign fishing fleets off our shores without consideration to efficiency or regard to the distant water logistics involved.

Also, in considering relative efficiency, we must consider the needs of respective national interest. Certainly, no United States fleet could economically operate in the same manner as the Soviet Union on many of the fisheries now exploited.

Inevitable Impact and Conflict

Recognizing this difference and isolating the individual problem, however, does not serve to solve the conflicts which we now have or are likely to have in the future with distant water trawlers off our coastline. The operation of a huge harvesting fleet, together with support vessels, despite the proven usefulness of the nine-mile fishery zone, cannot help but impair the efficiency and orderly harvest by the smaller coastal fishing vessels.

Our effort to date as a nation has been to resolve these conflicts or as many of them as possible through the aforementioned bilateral agreements. We have made similar efforts for orderly harvest in a specific area through the recent London Policing Conference, though universal ratification of that agreement appears to be somewhat distant, if not unlikely.

The argument posed that we should rush to sea with our smaller vessels to battle for fishing position on the grounds with vessels many times our size may sound heroic to the shoreside observer. When you speak to the captains of American fishing vessels who have been among these foreign fleets, their reluctance to return to the scene is not based on any intrinsic lack of courage, but rather stems from an unusual demonstration of common sense. The answer, therefore, to such problems must be found in setting aside areas for the domestic fisherman to prosper, whether this be done by extended jurisdiction or by area agreements. The latter course is being pursued at the present time, but the national coastal fishery clamor for broader jurisdiction is held back only by a present lack of confidence for success. Those who might feel this situation will remain static are not watching world fishery development or counting United Nations noses, and the recent distant water suggestion for United Nations control of the high seas is the best indication of that group's concern for the future.

Present United States government policy points to the potential violation of the 1958 Geneva Conventions to which we are signatory, as valid argument against an extension of jurisdiction beyond [illegible] miles. It must be remembered, however, that until the 1951 World Court Decision between the United Kingdom and Norway the same kind of case was being made against change of the traditional three-mile limit. Granted the three-mile was accepted world law for a long time, it would be foolish to base the life of the twelve-mile trend on any such premise, at least as far as fisheries are concerned. The world fisheries harvest is expanding rapidly, and modern technology and world food needs will force changes in law at an equal pace.

What Are The Alternatives?

The unilateral extension of fishery jurisdiction, United Nations control, or the negotiation of bilateral or multilateral agreements are not the only alternatives being suggested. In each case, however, there is an automatic cry that the concept of "Freedom of the Seas" may be restricted or violated. The question arises, however, with the rapidly increasing harvest of the world oceans and some obvious examples of overfishing and resultant depletion, that there must be a limit to this so-called freedom. Freedom to deplete cannot be justified in a world that is becoming increasingly hungry, and the once noble philosophy must be brought into the light and thoroughly examined.

The Congress of the United States has been regularly advised by fishery interests and others throughout the nation of methods to solve the conflict and impact of foreign fishing off our shores. The following are a few, some requiring mere unilateral action, others lending themselves to bilateral or multilateral agreement, and some necessitating the calling of a Third Conference on the Law of the Sea:

1. Extension of jurisdiction.
   a) Fishery zone of 200 miles
   b) Fishery zone to the end of the continental shelf
   c) A combination of (a) and (b)
   d) Delimitation of fishing zones by depth

e) Sole jurisdiction and sovereignty to desired distance or depth
f) Expansion of the abstention principle
g) Demanding a larger share of resources based on developing need
h) Establishment of narrow territorial sea with division of the high seas by the United Nations in the manner of land distribution
i) Strengthening and implementation of the 1958 Geneva Conventions.

2. Harvesting and marketing restrictions
a) Catch quotas by area and species
b) Restriction of port use by the coastal nation
c) Tariffs, quotas, duties on fisheries importation
d) Preventing over-capitalization by licenses, etc.
e) Gear restrictions, mesh sizes, etc.
f) Taxes, licenses, fees for distant water fishermen.

We might also choose the route of the Pacific Fur Seal Agreement, where Japan and Canada have forfeited their pelagic fishery rights in exchange for a share of the United States and Soviet harvest.

Obviously the foregoing list is neither comprehensive or complete, but gives some evidence of the diversity of thought toward achieving some answer to the problems. Many of these are wholly impractical, but such a label has not prevented fairly widespread support.

Enforcement and Dispute Settlement

Inherent in all of these proposals is the question of enforcement. It is fairly obvious that whatever scheme may eventually be established to reduce the physical or economic impact of the distant water fleets on the coastal fisheries, there must exist a cooperative attitude together with a firm and strict enforcement system. There are some nations in the world that do not look kindly on the patrol or boarding of their fishing vessels by nationals of another country, neither do they look with favor upon a universal or United Nations kind of enforcement arm.

Indeed, enforcement does not end merely with policing or arrest. The question of resolution of disputes is equally knotty. There is no doubt that part of the failure of implementation of one of the prime 1958 Geneva Conventions rests with the question of compulsory arbitration. The World Court is not a useful instrument in this regard unless the parties to the dispute are prepared to voluntarily submit their problems.

Present Jurisdictional Trends

It would appear that were normal trends allowed to develop in world fisheries, the extended jurisdiction course would be quite logical. The question would remain as to timing, but it is increasingly apparent that such development may be much closer than some think. It is obvious, however, that there are many who fear such a trend for substantial and obvious reasons, and they can be expected to agitate or pressure alternatives. The expression of support for division of the high seas by the United Nations is just such an alternative approach. For those who might think this an idle or unlikely possibility, it might be well to study the development and growing support for the recent United Nations Resolution. It is particularly noteworthy that many of the basic proponents of this scheme have no interest in fisheries impact, conflict or conservation whatsoever. Neither is their goal found in helping feed the hungry of the world. They are launched on what appears to be a reasonably sound method of providing independent financing of the United Nations--a method which they proclaim as essential to world peace. There are many of us who feel that the harvest of the sea, used toward the alleviation of world hunger, may very well be more important toward the goal of peace then the bailing out of the United Nations, and further are concerned about some of the practical aspects of such management and control by the United Nations. Dr. W. M. Chapman recently called attention to some of the problems of enforcement and management which might well take a disproportionate bite out of what is destined for the world organization.

It is quite obvious to most political observers that the United States government is not about to support any moves for extended fishery jurisdiction beyond the present twelve miles. Neither is the current Congress in the frame of mind to adopt such legislation or the objections of this or any ensuing administration. This does not mean, however, that the situation will not change, for as mentioned before, the present world fisheries regime is far from stable.

This leaves the route of a Third World Conference as a logical alternative for the protectionist or coastal state interest. Such a conference would require leadership, however, and many would look to the United States for such direction. Although the present attitude of the State Department in opposition to extended jurisdiction centers around the proclaimed threatened violation of three of the 1958 Geneva Conventions, it is quite obvious that this is merely the glib answer to forestall further question or effort from those who seek such expanded fishery ownership. The core of the United States position, as usual, goes much deeper than our international fishery commitments or interest. Once again we are faced with the national security and world waterway needs which unspokenly block the way of positive decision, just as they did in the two previous Geneva Conferences, and there are still a bruised and battered group of fishery delegates to these conferences around to attest to the United States desire to trade fish for things which we believe were of less value.

This is some distance from the suggested topic of this paper, and yet to discuss the impact of distant water fishing on coastal interests it is necessary to know why conflict occurs, what we are presently doing, and some of the alternatives which are being expressed.

The scope of the subject today does not permit the drawing of conclusions or the support of future direction. It would be hoped that discussion periods would serve to bring such conclusions before the interested legal and fishery people present.

PROBLEMS OF ENFORCEMENT OF FISHERIES REGULATIONS

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I feel I ought to start with two explanations. The first is since I happen to be in the employment of my government what I am going to say is made in my personal capacity and does not commit my government in any way. The second I think has been set out in the abstract of my talk. As I was asked originally to discuss the problems of fishery policing, and to trace developments from the Convention of 1882 to the recent fisheries policing conference, I thought it as well to point out that "police" and "policing" as used in those connections have rather a different meaning from what we understand by them now.

The title of the North Sea Convention of 1882, or rather Article I of that Convention, stated that its object was to regulate the police of the fisheries of the North Sea. "Police" is there used in a somewhat archaic way to mean good government and behavior. "Police" and "policing" now I think usually are thought to mean something more than that; that is, they now refer to the arrangements for seeing that rules and regulations are observed or, in short, enforcement. I think I shall start with some reference to the earlier conventions and the recent fisheries policing conference and then go on to the more general question of enforcement.

On the subject of good conduct and behavior, it is rather a truism to say that wherever fishermen from more than one country operate on the same fishing grounds it is very desirable that there should be some international rules to prevent interference by the fishermen from one country with the operation of fishermen from another country or countries; this was long realized in the United Kingdom where the fishing grounds are rather crowded with fishermen from several nations. The matter was first regulated in the Convention of 1839 between the United Kingdom and France, which introduced some regulations only for the waters between the coasts of the two countries, that is to say the English Channel. That settled matters there, but in the wider waters of the North Sea, where fishermen of several nations were operating, disputes and incidents were very common in the decades which followed 1839 and by all accounts something akin to active hostilities was rife. Wide use was said to be made by trawlers of an implement known as the "devil," which was designed for the sole purpose of cutting nets that were in the way of the trawlers; this was the result of the comparative innovation of trawling, and its interference with the much older methods of drift-net fishing which was the common method of fishing for pelagic fish anywhere in those days.

The disturbed conditions caused the British government to seek the cooperation of other countries in providing a remedy. The result was the convening by the Netherlands of a conference in the Hague in 1881. The object of that conference was to draw up rules for the conduct of fisheries in what were called the common waters of the North Sea, and an initial difficulty arose over the need to define the area to which the regulations would apply. The matter was settled by the inclusion in the resulting Convention of an article declaring that the fishermen of the contracting parties had exclusive rights to fishing within three miles of the low water mark and closing lines across bays of not more than ten miles wide. I mention this especially because it had important implications both for the coverage of the Convention and for later events. The rest of the Convention was taken up with rules of conduct and their enforcement. There were about ten articles dealing with such things as marking of boats and gear; these were done in meticulous detail, even prescribing the size of the letters and numbers, and the color of the paint--the oil paint at that--that was to be used in putting them on to vessels. The middle section of the Convention dealt with the conduct of boats on the fishing grounds, and included the more obvious provisions, for example, that fishermen should not make fast or hold onto the boats, nets, or gear of other fishermen. It banned the use of the instruments to which I have referred and dealt with the arrangements for disentangling nets and lines if they got foul of each other.

Perhaps the most noteworthy provision in this part of the Convention was that which enjoined trawl fishermen when in sight of drift net or line fishermen, to take all necessary steps to avoid doing injury to the latter, and placed the responsibility for any damage caused on the trawlers--unless they could prove that they were under stress of compulsory circumstances or that the loss sustained was not their fault. It is, of course, reasonable that a special responsibility should have been placed on trawlers who have their gear in motion and to some extent under control but the bias, in favor of the older, passive methods of fishing, owed something to the fact that at that time trawling was a comparatively new method of operation and was usually conducted from larger and more powerful boats.

The remaining articles of the Convention dealt with enforcement of the rules. The superintendence of the fisheries was placed in the hands of naval vessels of the contracting parties except Belgium, which could use any state-owned ship provided it was under the command of a captain holding a commission. The rules relating to marking of boats, gear, and such like, were placed under the enforcement of national authorities, and it was only the rules for the conduct of fishing on the fishing grounds which had an international element about them.

The powers which inspection ships could exercise with respect to fishing vessels of any nationality covered by the Convention were set out in this part and included powers to investigate infringement, to board vessels, to obtain proof of offenses, and in grave cases to arrest a fishing vessel or members of its crew. Commanders could also, with the consent of the parties, arbitrate between them at sea. I am not going to say much about how these provisions have worked in practice, mainly because the Convention set up no centralized international body to supervise its application. When its international enforcement provisions have been invoked it has usually been on a bilateral basis and it is extremely difficult to obtain specific information on the subject. I think it would be true to say, however, that the occasions on which the powers of arrest have been used by a vessel of one country over a vessel of another country, have been very few and far between, and that the chief value of the power of arrest contained in the Convention lay in its deterrent effect. It is also true that the enforcement of many of the provisions of the Convention was in the hands of national authorities. The Convention was, in fact, embodied in national law, and although much of the enforcement we do nowadays stems from the Convention it is not labeled as such.

It is also true that incidents between fishermen of different countries usually take place when there is no policeman around; such incidents usually resolve themselves into claims for damage which are pursued through ordinary channels. So the fact that the international provisions of the Convention have not been used very extensively does not mean that the Convention did not have a good effect. Its coverage, however, was rather small; it applied only to the North Sea as defined, and only six countries subscribed to it. Norway and Sweden, which at that time were united in one kingdom, participated in the Conference but did not subscribe to the Convention because they could not accept the fishery limits defined in the way to which I have referred. Although provision was made for their adherence at a later date, they never did so. But although the coverage was limited I think there can be little doubt that the Convention of 1882 was an important landmark in the progress towards orderly conduct in international fisheries, and that it set a pattern of behavior which by and large came to be accepted by fishermen generally, whether they belonged to the signatory states or not.

This does not mean, of course, that incidents and disputes no longer occurred. Far from it. They are most liable to arise when large fleets of mixed nationality congregate on some favored fishing ground. We have found that when these concentrations can be foreseen, it helps to have the area patrolled by a protection ship, even though it has no specific powers in relation to many of the fishing vessels which are there since they do not belong to any of the signatory states. But it has long been felt that the situation could be improved if the coverage of the Convention were wider, and this brings me to a consideration of later events.

The provisions of the 1882 Convention concerning fishery limits may in fact be said to have had a direct effect on the recent Policing Conference in London. As a preliminary to the evolution of the new regime of fishery limits embodied in the European Fisheries Convention of 1964 the United Kingdom withdrew from the 1882 Convention, and it was at the Conference convened for the purpose of that Convention that the idea emerged that attempts should be made to replace the 1882 Convention by a new one which it was hoped would bring its provisions up-to-date and give it a wider coverage both in the area of its application and the number of participating countries. In fact, with this object in view the Conference dealing with the European Fisheries Convention passed a resolution requesting the United Kingdom to invite all countries participating in the Northeast Atlantic fisheries, as well as Canada and the United States, to send representatives to a preparatory technical conference. The United Kingdom did so in 1965 and thereafter convened what is called the Fisheries Policing Conference, which held six sessions in 1966 and 1967. Representatives from eighteen countries, including Canada and the United States, took part, and an agreement was finally reached at the last session in March this year on the terms of a draft convention covering the whole North Atlantic. This was adopted at referendum. The Convention was open for signature on 1 June, and will remain so until 30 November. Thereafter it will require ratification by at least ten signatories before it enters into force.

One must be careful not to assume, therefore, that it is a fait accompli. Nevertheless, I think it is reasonable to regard agreement on the draft Convention among representatives of so many countries whose practices and interests differ, as a substantial achievement which augurs well for the future. Perhaps it would be desirable to take a brief look at what this Convention provides. I would mention here that steps were taken to avoid the ambiguity about policing, because the Convention is called the Convention on Conduct of Fishing Operations in the North Atlantic. It does not use the word "policing."

The geographical scope of the new Convention is very much wider than that of 1882, and unlike its predecessor it applies both within and without the fishery limits. The scope of its content is however very much the same as that of the earlier one--in the marking of boats and gear and rules covering operation of fishing boats. Generally speaking the detailed rules are set out in annexes, while the body of the Convention deals with the governing principles, with the obligations of government, and particularly with arrangements for international inspection and enforcement. I am not going to make a detailed comparison of its provisions with the earlier Convention, but I think it might be well to pick out one or two of the features of the new Convention.

In dealing with the marking of boats and gear, I am glad to say it does so in much less meticulous detail. This was partly because it was found very difficult to reach agreement among eighteen countries as to the precise way in which to put the name of a boat on its bows, or its stern, or amid-ships, and to the color in which these names were painted, so the Convention does this in general terms. On the marking of gear, however, I think it is a little bit more specific than the older Convention--partly because experience has shown this to be necessary and partly because it takes account of the new fishing methods that have been developed since 1882. The point that I mentioned earlier that this Convention applies inside fishery limits is perhaps worth mentioning specially. There was a good deal of discussion at the conference as to whether general rules should apply only outside fishery limits or, as the jargon has it, "from coast to coast." It was argued that although within fishery limits fishing may often be confined to vessels of the coastal state, this is not always so; in any case it might be helpful to shipping generally if the same rules (for example, those relating to marking of gear and lights) could apply inside as well as outside fishery limits. On the other hand, several countries felt that it would be difficult to apply the general rules inside a fishing limit especially to small boats which in practice may rarely, if ever, go outside the limits. In any event, it was agreed that the general rules should apply from coast to coast, but that the coastal state should have power to make special rules and exceptions for vessels and gear which by reason of their size or type operate or are set only in coastal waters.

Enforcement is perhaps the most important part of the Convention and there are two aspects of this. The first concerns the obligations of contracting states with respect to their own vessels, while the second concerns international arrangements. On the first, the Convention includes the customary provision that the contracting states undertake to take appropriate measures to implement and enforce the Convention on their own vessels, but there was a good deal of argument on the question of jurisdiction in the cases where vessels from one country are allowed to fish within the fishery limits of another. I don't think I need to go into that here, and I will pass on to the international arrangements.

The principle was accepted, as in the earlier Convention, that there should be international arrangements on the high seas to secure observance of the Convention under which duly authorized officers of any contracting state can exercise power with regard to fishing vessels of any other contracting state. The underlying thought is, of course,

that in this way greater resources of control can be brought to bear than any one country can apply to its own vessels on the high seas and that this principle would help to insure that control was applied uniformly to the fishermen of different countries. The dominant mood of the conference, however, was that actions of inspecting officers of one country with regard to fishermen of another country should be very closely defined. Such actions should be confined to what is strictly necessary to detect infringements and report them to the flag state, in order to reduce to a minimum interference with the fishing operations. The arrangements set out in the Convention therefore specify in some detail the powers that authorized officers may exercise in relation to vessels of another flag state. In passing I should mention that these officers must be carried in ships, though not necessarily naval or inspection ships. They can be carried in fishing vessels. There was a good deal of discussion about the use of aircraft for inspection purposes but this was not permitted. (I will say a little more about that later on.)

The authorized officers are given the general duty to inquire into and report on infringements, and to seek information. In cases of damage, where they have reason to believe that the vessel is not complying with the Convention, an authorized officer is empowered to seek information from the vessel. If the matter is sufficiently serious--and I am more or less quoting here--he may order the vessel to stop, and then, only if it is necessary to verify facts, may he board the vessel. Now some of you may think that this is very restrictive in the light of some other conventions which are not nearly so specific. In all cases authorized officers are required to report their findings on a prescribed form to the competent authorities in the flag state, and contracting states are obliged to consider and act on these reports on the same basis as reports of their own national officers. It follows that any proceedings resulting from the report of an officer would be taken in the courts of the flag state. There was considerable discussion about the need to secure uniformity of treatment at this stage. It was recognized, however, that there was considerable divergence of practice and procedure in different countries, and that what is sufficient evidence to secure a conviction in one country may be quite insufficient in others. For this reason the Convention provides that contracting states need not give a report of a foreign authorized officer a higher evidential value than it would possess in the authorized officer's own country. For the same reason complete uniformity of treatment may be difficult to secure but the Convention obliges contracting states to collaborate in order to facilitate judicial or other proceedings.

I should perhaps say at this stage that some countries had considerable reservations about these international inspection arrangements. They were persuaded to accept them as part of the Convention only at the cost of including in the Convention the specific power of reservation in regard to them, so here is one reason for not expecting that these international arrangements may operate fully between all the signatory countries. But it is hoped that very few countries will make use of this reservation.

In passing I might say again that this new Convention does not include the power of arrest or seizure of a vessel. There was a good deal of argument about this too at the Conference and there were some countries who thought that a Convention which did not include such powers would have no teeth in it. On the other hand, it was pointed out with some justice that similar powers in the 1882 Convention had very rarely been used, and the upshot was that these powers were left out. But it is interesting in this connection to note the several international conventions in the Pacific which do include this power of arrest; two of them I think have been exercised within the last two years. Maybe it is easier in the Pacific than it is in the Atlantic to get agreement on these matters.

Time alone will show whether the provisions of the new Convention will be effectively enforced. My own experience with the enforcement of the domestic regulations in national waters leaves me to think that fishermen are as good as any at taking liberties with the law when they get the chance, and of behaving as they should when there is a policeman around. Accordingly, the observance of rules is best insured by employing as large a police force as possible in the wide areas of sea where fishermen operate. I believe, therefore, that if the international enforcement arrangements I have described are put into operation, they will prove their worth and be beneficial to the peaceful and orderly conduct of fishing.

So much for rules of conduct. It is just as important, of course, to enforce other rules such as conservation regulations in the North Atlantic. We now have two regulatory commissions, one on each side of the ocean. To date, only regulations on minimum mesh size are enforced on either side of the Atlantic, with the exception that on the eastern side there are minimum sizes of fish laid down also. The primary responsibility for enforcement of these measures rests with the flag state, but it has long been felt desirable to supplement these with international inspection arrangements. The Northeast Atlantic Fisheries Convention of 1959, therefore, empowered the Commission it established, called NEAF for short, to recommend international measures of control on the high seas. The corresponding commission for the Northwest, ICNAF, does not at present have similar powers but it is in the course of getting them. After a good deal of preliminary consideration, NEAF at its meeting in May of this year reached agreement on recommendations to governments that international inspection arrangements should be established. This recommendation is still open to objection by governments, and the arrangement cannot in any case come into operation until 1969, so here again one is talking about the future. Nevertheless, I think the adoption of this recommendation by the Commission is important as a definite step forward, as a first example of enforcement of conservation measures in a general fishery situation. I say "general" because the other examples that there are apply mostly to rather special situations.

I shall not describe the arrangements adopted by NEAF in detail, although there are several comments I should like to make. First, the arrangements have much in common with the arrangements I have already described under the new Convention, partly because they were incubated over very much the same period of time during the last two years. It is possible that the same officers will be authorized by some countries for the purposes of both, and I venture to hope that as the two schemes develop they will, so to speak, fertilize each other to the advantage of both and strengthen them both. Secondly, arrangements provide that the contracting states inform the Commission in advance of their provisional plans for participating in these joint arrangements and allow the Commission to make suggestions for the coordination of national operations, including the number of inspectors and ships to be used. This provision stems partly from the fear expressed by some countries that the whole scheme might be uneven in effect as between different countries. This is a very real fear in some countries, and to guard against it the scheme allows pairs of countries to agree bilaterally and between themselves on adjustment of plans, and to suspend the operation of the scheme until adjustments

have been made to their mutual satisfaction. This is an important point because several countries will not accept the general arrangements as they stand without a lot of bilateral adjustment.

This provision that I was referring to about the plans being submitted to a commission also provides the means (and this is perhaps the most important point) for coordinated arrangements to be made. This may take some time to shake out in practice, but it seems to me that here at least are the seeds of what you might call a truly international policing scheme. In this respect the existence of the Commission as the father of these arrangements provides opportunities which do not exist under the Policing Convention, if I may so call it, because there is no central body under that Commission to coordinate arrangements.

The new joint inspection scheme may be especially valuable in relation to mesh regulations in two different ways. First, however well these regulations are enforced at the national level (which broadly means enforcement when the boats are in port), it is difficult to be sure that the regulations are always observed when the vessels are fishing, partly because the regulations themselves necessarily have many exceptions for fishing for particular species, and partly because it is well known that there are practices which in effect nullify minimum mesh regulations. Second, it is commonly said that fishermen are inclined to believe that the regulations are enforced more strictly on themselves than they are on fishermen of other countries. International inspection arrangements may do much to remove the cause of such fears if they are well founded, and at least make it clear that the regulations are uniformly enforced or run. This, I think, is more important than it may sound, for the acceptance of any law or regulation and its proper observance depends a great deal on whether it is believed to be fair. This is a point which may be important in relation to new types of conservation measures which may be introduced in the future.

We are at or nearly at, should I say, the threshold of new conservation regimes, for it is widely recognised that in many situations on the high seas regulation of meshes alone is insufficient to secure conservation of stocks. In fact, there is a good deal of evidence that their effect can be greatly reduced if not nullified altogether by the build-up of fishing effort. In the North Atlantic both Commissions have been worried on this score and have begun to consider ways and means of combating the trouble either through effort regulations or by catch quotas. One can only speculate on how these ideas will take shape and how quickly. I am here talking about the present regime because in international affairs there have been a good many things that have been said about new regimes or possibly are going to be said about new regimes.

One of the difficulties is, of course, that there are as yet no generally-accepted units in which fishing effort can be measured. For this reason it may be easier to regulate effort by means of catch quotas, yet it must be recognised that however regulation is done there may be difficulties of enforcement to insure that the effect of the measures adopted matches the requirements of the situation on the fishing grounds. Catch controls can easily enough insure that the total overall catch by national fishing fleets is at an acceptable level, but with highly mobile fleets it may be difficult to make sure that too much is not taken in one area where the stocks are under strain. With direct control of fishing effort it may be equally difficult to insure that too much effort is not devoted to particular areas. For these reasons it may in the end of the day become necessary to evolve more refined methods of control. Neither catch control nor regulation of effort, in their present rather rudimentary form, or forms being talked of, lend themselves to international control measures; since you can't very well check the catches of a fishing vessel on the high seas, it is rather meaningless to set up such controls. Equally, you can't very well test whether or not if you see a fishing vessel in a particular area, its catch is within the limits of the national quota. These things can only be done centrally, unless your scheme of regulations is very detailed. Indeed, it is not possible to conceive detailed arrangements, whereby you might license fishing vessels for particular areas, which would lend themselves to international control; this is perhaps one of the things that ought to be kept in mind in further consideration of this question.

I am talking here about the general fisheries situation, because in special situations I think you can do these things with considerable effect. There are, of course, other ways of conserving stocks and both North Atlantic Commissions are empowered to recommend closed areas or closed seasons, but in general these methods have not appealed. I don't want to discuss the merits of such conservation measures except to note that these are among the easiest conservation measures to enforce. You can see whether fishing vessels are in an area where they should not be, although in practice there still may be complications. When you have a line of demarcation to enforce, on one side of which certain boats are allowed to fish and on the other side they are not, we often have difficulties in insuring that the line is observed; if the boats can legitimately fish on one side of the line, and if the policeman doesn't happen to be around, they can easily hop across onto the other side. Our fishermen have a very good bush telegraph service, so they have a pretty good indication of where the policeman are at any one time, and we have to exercise a great deal of ingenuity to overcome this. Aircraft can help us in this connection--which brings me back to what I said earlier--although they are not much use in bringing vessels to book. You can't very easily board a fishing boat from aircraft without some cooperation from the fishermen themselves. We do find, however, that aircraft are very useful in making quick reconnaissances of areas and that aircraft can be used in cooperation with surface craft to direct them to the right places and to keep probable offenders under survey until the surface craft arrives. I venture to think if closed areas were adopted internationally as conservation measures and if the areas concerned are rather large, there might be considerable difficulty in policing them.

DISCUSSION

Notice was taken of the slow progress in the Atlantic in implementing international fisheries agreements because of the lack of effective monitoring provisions. Many American fishermen feel that international regulations are not being enforced by certain other nations and thus these fishermen are reluctant to abide by the regulations themselves.

OVERCAPITALIZATION OF THE FISHING EFFORT

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The interest of economists was first drawn to the marine fisheries by serious evidences of economic weakness in the performance of the industries based on them. Despite a growing web of regulation, a number of important commercial fisheries had been seriously depleted over the years. Incomes in most commercial fisheries are relatively low, and very few seem to yield adequate profits to entrepreneurs once the first flush of production from virgin stocks is over. Perversely, the most serious difficulties appear in fisheries where the value of the end products is highest relative to the cost of harvest. Finally, there is much perplexity and concern over the simultaneous existence on the one hand of large undeveloped stocks of marine fish that could provide urgently needed protein foods and on the other of different marine stocks subject to severe overexploitation.

The reasons for these anomalous results have been analyzed carefully in previous papers, and only a brief recapitulation is called for. If a fishery were subject to unified control (which amounts to saying if it were owned by someone), the conditions for optimal utilization of the resource would differ from those of other natural resource-oriented firms and industries only in the high degree of uncertainty about input-output relations characteristic of fisheries. But ownership in any meaningful sense is almost never possible in marine fisheries. The physical difficulty of delineating and holding claims to specific stocks of mobile animals in the sea, together with a long standing predilection for freedom of entry, both international and national, have made most of the world's high-seas fisheries common-property resources, accessible to anyone capable of mounting the technical effort required.

The results of this situation are inevitable and undesirable. As long as there is a gap between expected returns and expected costs (i.e., as long as there is any net rent to be realized), new firms will be attracted to the fishery, even if the resource is already being exploited to the point where further increases in effort produce no increase in output. In technical terms, there is an important external effect which is not and cannot be recognized by any individual vessel or fleet operator: the level of fishing mortality in the current period has important effects on the total weight and size composition of the catch that can be taken at a future date. In this sense, a fish stock is comparable to a growing forest. The significant difference is that the owner of a forest can decide between today's and tomorrow's harvests whereas the fisherman, operating in a completely open-access industry, simply cannot make these decisions, even if the necessary biological information were available to him. The fish that he does not catch today will not be available, larger and in more marketable form, in the future. They will simply end up in the nets of a competitor.

Given particularly favorable relations between the prices of end products and the costs of fishing, it is perfectly possible for equilibrium to be reached only at levels of fishing effort at which marginal physical product is negative. From any point of view, biological or economic, it makes no sense for a fishery to reach a steady state position under circumstances in which a reduction of effort (and cost) would result in an increase in physical output (and dollar revenue). Yet this is precisely the situation that prevails in many of the heavily exploited species of fisheries of the Atlantic and Pacific, and it threatens to become the general situation throughout most of the world's demersal and anadromous fisheries (and perhaps in some of the pelagic as well).

The situation becomes more complicated, though not altered in any basic respect, when the high seas fishery is international rather than national. The obvious complications are: (1) different nations with different incomes, tastes, and preferences will not have identical demand for fish; and (2) relative prices of labor, capital, and management will differ among countries, giving rise to different optimal combinations for greatest efficiency of fishing operations. Clearly, then, no single set of decisions as to the level of fishing effort, the types of gear to be employed, and the fish to be harvested will be ideal from the standpoint of every participating nation. In addition, the distribution of the resulting catch remains unresolved even if the nations could agree on the right level of total effort and the proper ways of carrying it on. The problem is not merely one of maximizing the total economic yield from the resource and then finding a way of dividing it. For some nations, moreover, the foreign exchange problems may be so severe as to dictate a policy of pressing for a larger share, even if this results in a decline in the total catch. Severe unemployment problems in the fishing sector of a nation may give rise to the same kind of attitude.

Traditionalists among fishery scientists feel that economists have been far too pessimistic in the analysis sketched above. The skeptics fall into two classes: those who simply do not believe that the industry will behave in the way indicated, and those who argue that the potential productivity of the living resources of the sea is so great that only market limitations prevent mass expansion of output without much danger of overfishing in the sense suggested in our analysis. The latter argument has, by now, been pretty well disposed of in the literature. No one who has followed the course of fishery development on the high seas during the last few decades can be unmindful of the fact that severe overexploitation of some species can exist cheek by jowl with underutilization (or no utilization at all) of others. A fish stock is, after all, a natural resource like many others--an input in the productive processes, but only one of several. The extent to which a given stock will be used is thus a matter of the intensity of demand for its end products and of the aggregate cost of the activities necessary to produce them--fishing, processing, and marketing. The existence of large unexploited and underexploited stocks of fish may well blunt the impact of overfishing on the more accessible and desirable species through substitution effects and through the stimulus to improved technology created by growing scarcity of the more valuable fish. But there are limits to both effects. It has become abundantly clear that severe wastage of labor and capital is increasing even more rapidly than had been expected in sea fisheries subject to constrained supply and intense demand.

Moreover, we find (to our great distress) that the bioeconomic model of a high seas fishery open to all comers performs about as we had expected. A series of industry studies completed over the past decade without exception

indicate the pattern of development outlined in the models referred to earlier. The only qualifications are in the wrong direction: as noted earlier, the lack of symmetry between entry to and exit from the fishing industry seems to result in a symptomatic tendency for capacity to overshoot the equilibrium level severely, resulting in deeper and more persistent depression of incomes than the equilibrium model would predict. It is also clear that we underestimated the competitive drive to increase one nation's share of a static or dwindling fishery by the building of larger vessels with greater range and fishing capacity. In the small boat fisheries, the effects of overcapacity and depressed earnings have typically been to block technological progress; in some cases "conservation" regulations have been specifically designed to prevent any improvement in the sweep efficiency of the individual unit. But in other cases, most notably in the North Atlantic, the relatively large, well-financed fleets of some market-oriented economies, as well as the new and highly efficient vessels of the Soviet Union and Poland, are being spurred to greater and greater efforts to improve national shares of a virtually static fishery by increases in the effectiveness as well as the number of fishing units.

How serious is the resulting economic waste? If no more were at issue than the argument that maximum sustained physical yield always results in a level of output higher than one should seek (since the last units of effort have a finite cost, but produce additions to output approaching zero), our concern might be small indeed. But much more than this is involved. Many of the most desirable resources of the sea are valuable enough relative to costs of production so that very substantial amounts of excess capacity indeed may be reached before economic desperation brings the process to an uneasy rest. The stakes are much too high to play the game with such cavalier stupidity. Let me turn briefly to some specific examples.

Professor Giulio Pontecorvo and I have recently completed an economic analysis of the Pacific salmon fishery, a major purpose of which was to estimate the amount of economic waste existing in the fishery. Since the Pacific salmons, almost without exception, return to their spawning rivers as mature adults to complete the reproductive cycle before dying, they are therefore accessible to several kinds of fishing gear while tightly concentrated in inshore waters. They are, of course, among the highest-priced fish taken in salt water; and--unlike most marine fish--the anadromous salmon can easily be overfished to the point of complete physical extinction. The economic story of the development of the Pacific salmon fishery can be told in one simple and appalling statistic--the total number of fishing units has tripled over a period in which the total catch has declined substantially. Moreover, the fishery has developed under a variety of severe restrictions, some having the avowed purpose of reducing the efficiency of the individual unit, and others producing the same effect indirectly.

It is impossible, with existing data, to make a precise estimate of the potential net economic yield from the fishery as a whole, i.e., the difference between market value and the lowest cost that could be achieved with existing technology and knowledge. It has been possible, however, to develop fairly detailed estimates for individual areas, and these can be extrapolated roughly to provide estimates for the remainder of the fishery. The results are more than slightly disturbing. On the most conservative possible assumptions--that is, that the fishery is carried on with existing types of gear, adjusted only to eliminate the redundant units--it appears that 50 per cent or more of the capital and labor employed represents sheer waste. The regulatory authorities have been able to stave off disaster only by stringent limitation of the number of days that the gear can be used during the fishing season, and by equally stringent proscription of the most efficient types of gear. It is highly likely that the resulting estimates of economic waste (approximately $45 to $50 million annually in British Columbia and the four Pacific states) would be even greater if the benchmark were the cost of harvesting by the most efficient types of gear known, and with full flexibility to introduce other techniques new to the fishery. This is no idle comment. At present, purse seiners are denied the use of electronic fish-finding equipment or spotting aircraft; nets of all kinds are limited as to size and depth; size limitations are imposed on vessels prohibited everywhere. California has reached the ultimate in regulatory inefficiency by prohibiting the use of any kind of nets--salmon can be taken only by the very inefficient trolling gear.

A second example is furnished by the widely praised Pacific halibut program. You are all doubtless aware of the splendid record of the Halibut Commission in rebuilding the sadly depleted stocks of this valuable species from a level yielding only about 34 million pounds at the low point in the 1930's to catches of approximately 70 million pounds in recent years. But this triumph has not been without its economic costs. To maintain firm control over the fishery and over the statistical underpinnings necessary for interpretation of the state of the stocks, the fishery has been restricted entirely to a long-line operation. A number of authorities have argued persuasively for some time that at least part of the operation could be conducted much more efficiently by various types of nets. If not, this would certainly be the only major demersal fishery on record in which long-lining was the most efficient technique.

In a physical sense, the halibut program has been far more successful than any regulatory measures in the Pacific salmon fishery, with the possible exception of the excellent Fraser River program. In an economic sense, however, the record appears disturbingly similar. The number of vessels engaged in the halibut fishery nearly tripled during a period in which the total permitted catch rose by only about 50 per cent. The inexorable facts of economic life were at work, as the fishery recovered, the unit costs of catching a pound of halibut declined, and more and more vessels were attracted to the operation. The tremendous surge in prices of halibut during and after World War II brought a record number of boats into the fishery and, while the number of vessels has tailed off slightly in recent years, it still remains true that the season lasts less than half as long as it might if the fishery were conducted by only the number of vessels required to take the permitted quota. Only the imposition of a layover provision, under which each vessel must spend a specified number of days in port between trips, has prevented further shortening of the season. Indeed, before the layover program was introduced, the season was compressed to less than thirty days in one major area and less than sixty days in the other.

The economic costs of this situation have been documented elsewhere and need not be repeated here. Suffice it to say that a fishery with a gross value of perhaps $15 million annually is wasting $7 to $8 million in excessive costs, most of it in the form of redundant fishing equipment, but much also in unnecessarily high frozen-storage costs and loss of quality resulting from the prolonged storage necessary to even up flows of fish over the marketing year. Despite the brilliant success of the biological aspect of the program, returns to individual halibut fishermen, adjusted for changes in the general price level, are almost exactly what they were in the days of severe depression and overfishing; the average age of the vessels in the United States halibut fleet is about thirty years, and the return to

investment for the fleet as a whole has been very low or negative in recent years. A kind of economic Malthusian process has eaten up virtually all of the potential economic gains that a well-planned and executed scientific and management program had made available to us.

Let me shift now to the other side of the continent, and take a brief look at the fisheries of the North Atlantic. For several years, the International Commission for the Northwest Atlantic Fisheries and the Northeast Atlantic Fisheries Commission have been increasingly concerned over evidences of declining yield in the face of expanding fishing capacity throughout the major cod and haddock fishing areas of the entire North Atlantic. In addition to the regular statistical work of the commissions, a working group was convened by the International Commission for the Northwest Atlantic Fisheries to investigate the need for regulatory action and the degree to which performance of the cod and haddock fisheries might be improved by alternative programs. While these studies are not yet complete, the general order of magnitude of the economic waste implicit in the situation can be indicated.

ICNAF and NEAFC data on landings and effort, gathered for some time, were analyzed recently by members of a working group to give some idea of the present relevant yield functions in major subareas of the North Atlantic cod and haddock fisheries. It must be emphasized that for several fairly important fishing areas in the North Atlantic adequate data do not yet exist. But for areas accounting for about 75 per cent of the total catch, it was possible to indicate approximately the potential impact on physical yields of a reduction in fishing effort. The results of these preliminary investigations confirm the fact that the overfishing problem, in the critical economic sense, is already upon us in the North Atlantic.

The findings are particularly important, since they stress that reliance on physical catch as a guide to the health of the fishery is completely inadequate. The yield functions for these demersals are relatively flat over a substantial range in the vicinity of maximum yield. Consequently, it cannot really be argued that the physical productivity of the stocks has been impaired. Obviously, what is happening is that a larger proportion of the total catch now consists of smaller fish; while total yield is being maintained, it is made up increasingly of new recruits, taken with considerably higher fishing effort and--in most cases--providing somewhat lower marketable yields. The real problem, then, is entirely economic. Ignoring for the moment the wide fluctuations in year classes that make "maximum sustained yield" a somewhat tricky concept, particularly in the short run, it can be said that any further expansion of fishing effort will not increase total output and may even decrease it as the fishery moves toward or closer to a long run equilibrium position. (The latter point is significant, since the increase in effort in the past few years has been very rapid, and it is likely that the fishery is still in short-run disequilibrium.)

The general results of the working group analysis are summarized below. It is apparent that effort could be curtailed by amounts ranging from 10 to perhaps 30 per cent with no decrease in equilibrium catch levels and with some possibility of increases ranging from 2 to 5 per cent. Equally significant, the cod and haddock are relatively fast-growing demersals; hence, the adjustment period required to regain (and perhaps surpass) the catch level from which the initial curtailment was undertaken is not unduly great. If one assumes that the fishery is in equilibrium at the present time, the initial catch levels would be reached in about four to five years, with lower fishing inputs and an increase in the average size of individual fish taken. On the more likely assumption that equilibrium has not yet been reached, the reduction in catch would not be proportionate to the reduction in effort, and the recovery period would be correspondingly shorter. Equally important, the mobile vessels of the distant water fleets could and doubtless would be deployed to other operations, so the economic loss during the interim adjustment period would be smaller than the decline in physical catch from the areas in question.

The economic significance of these findings is apparent. The reduction in effort would produce, in the long run, a more than proportionate reduction in cost, since the reduction would almost certainly be accomplished by removing the least efficient vessels first. Even on the assumption of a reduction in costs only proportionate to the reduction in effort, net economic gains ranging from 10 to 20 per cent of the gross value to fishermen of the North Atlantic cod and haddock catch is a plum well worth seeking, to say the least.

An excellent paper prepared by Drs. Hennemuth and Van Hair ties down the short-run effects much more specifically. Their study dealt with the George's Bank haddock fishery, with particular reference to the American fleet operating on these stocks. Detailed data were available to indicate the sales and cost structure of representative American trawlers operating in this fishery. On the basis of their estimates of the short run and long run effects of effort curtailment on total catch, it is possible to reorder the cost and revenue figures for the representative vessel to indicate the financial results to be expected--and these are dramatic. Even if the effort reduction were accomplished simply by spreading the reduction in fishing days among existing vessels, the equilibrium values attained (at the end of seven years) would increase crew earnings by about 17 per cent, with a reduction in losses to the individual vessel owner of about $7,500 annually. On the more rational assumption that the reduction in effort would be accomplished by reducing the number of vessels proportionately, a very large increase in crew shares would result (from $115,000 to $181,000) and a severe loss position for the vessel would be converted into a handsome profit (from -$8,000 to +$30,000).

There is no reason to anticipate any improvement in the situation of the North Atlantic fisheries in the foreseeable future. A recent study by the Organization for European Cooperation and Development concluded that by 1970 the effective fishing capacity of fleets exploiting the North Atlantic might be expected to increase by 10 per cent or more over present levels--this in the face of the finding that little or no increase in output of cod or haddock may be expected. While no increase is expected in the number of vessels in the fleets of most of the major market-oriented economies, improvements will continue in the range, speed, and ratio of fishing to total elapsed time away from port. It is expected that the Soviet Union and Poland will continue to increase the number of vessels destined for the North Atlantic fishery (though they may be capable of fishing elsewhere as well).

The situation in the fisheries cited above may be expected to recur in other parts of the world. There are already grounds for concern over the state of demersal fish stocks on the major trawling grounds off the coast of Mauritania and Senegal. Even the coast of Southwest Africa, surely one of the more remote areas in the world, is now being

exploited by modern commercial vessels of no less than fifteen nations. Yellow fin tuna stocks of the Southeast Pacific are already being fished at or beyond the level of sustained physical yield, and all evidence points to the development of the same situation in the Atlantic tuna fisheries.

The lesson that emerges from each of these examples is painfully clear. Given fish of sufficient value relative to cost of capture, there is an inevitable tendency for excessive fishing effort to develop. In cases where the function relating yield to fishing effort is relatively flat near its maximum, or where no discernible maximum exists, the "damage" has little or nothing to do with the yield of fish products as such, and any approach to national or international management of marine fisheries couched in terms of purely physical objectives simply cannot come to grips with the basic problem involved. As long as individual vessels or national fleets cannot make decisions based on the essential link between today's activity and the yield in subsequent periods, the participants in an open access fishery will inevitably understate the present costs of their activities. Even where actual output falls short of the maximum physical yield that could be attained, the tendency will be simply to use more resources to take the given yield in any marine fishery in which entry is completely unrestricted.

If, as in the North Atlantic case, the participants are financially equipped to compete aggressively in fishing technology, the degree of overcapacity and of overfishing in the economic sense is likely to become even greater, even though, on the surface, the fishery is less absurd in its economic aspects than those in which regulation deliberately freezes the industry in a state of technical backwardness in order to hold fishing pressure down.

The North Atlantic case also illustrates the futility of a partial approach to regulation, even in the biological sense. A great deal of useful information has been developed regarding how various mesh sizes affect the yield of demersal stocks in the North Atlantic area, largely taken by trawls. But since there is no effective limit on total effort, the gains realized have been dissipated entirely in increased effort by the participating nations.

Perhaps the most frustrating feature of this situation is that it cannot be traced to individual irrationality, ignorance, or monopoly--the usual whipping boys. From the standpoint of the individual fleet or nation involved, a move to increase its share of a catch fixed by natural productivity of the stocks or by regulations would produce a significant gain to the innovator if everyone else stood still. But everyone else must be well aware of the action taken and will suffer less damage if they expand their own effort accordingly, even though the overall futility of the combined expansion is apparent to everyone. There is more than a glimmer of truth to the argument that the really low cost producer might, therefore, benefit by "fishing everyone else off the sea." The problem is that everyone cannot increase yields simultaneously. Until this can be driven home, the possibility of realizing all--or even a meaningful portion--of the real potential of the living resources of the sea is remote. No combination of limitations on fishing mortality, however ingenious, can avoid excessive entry and economic waste unless explicit steps are taken to prevent it. Despite the obvious advantages of what is literally "something for nothing"--achieving the same or greater output at lower cost--it has not been possible to follow this course in any major international fishery. Why?

The North Atlantic case offers a good illustration of some of the obstacles to the development of a controlled entry fishery. Note that none of these can refute the central proposition that if we catch the same or greater quantity of fish with a substantially smaller effort we are better off. The problems deal entirely with the distribution of the proceeds--but they are no less severe on that account. In the Northwest Atlantic, for example, the Canadian position is an uneasy one in two respects. First, in an effort to protect severely depressed isolated fishing communities in the Maritime Provinces and Newfoundland, Canada followed for decades a policy of prohibiting more efficient, larger scale, fishing vessels. As a result, it is felt by many that the Canadian share of the Northwest Atlantic catch has not yet reached a level at which Canada would be willing to settle down to a long term management program. The seriousness of the situation is, of course, accentuated by the fact that limited outward mobility of labor from Newfoundland and the relatively sparse opportunities for industrial development based on resources other than timber and fish in both Newfoundland and the Maritimes make the fishery a serious political as well as economic problem in Canada.

The Russians, on the other hand, have been rapidly increasing their share of the catch from the North Atlantic in recent years. Since the Soviet Union is using the latest type of large scale fishing and floating processing equipment, it may well appear that its interests would best be served by continuing the status quo, even at cost of some reduction in total yields, if the Soviet share could be increased significantly in the interim. Poland is also in the process of expanding a deep sea fleet capable of fishing almost anywhere in Atlantic waters, and obviously would prefer that as much as possible of the catch required to utilize the new fleet fully come from the more accessible North Atlantic grounds. Iceland and Norway are both heavily dependent on exports of processed fish from the North Atlantic to maintain balance of payments equilibrium, and both are dependent on relatively small vessels of limited range that could not be deployed effectively to other areas if entry to the North Atlantic should be closed and gear reduction programs instituted.

On the Pacific side, the conflicts are simpler but still deep running. At risk of some oversimplification, the situation looks roughly like this. The United States and Canada, with relatively high wage structures and long distances to central markets, are exploiting fully only the high-valued species--salmon, halibut, and king crab. They are making only light use of the huge stocks of groundfish in the Northeast Pacific and the Bering Sea. The Soviet Union and Japan, on the other hand, face preference schedules that dictate the desirability of using large, highly efficient fleets to catch large quantities of groundfish, and would be little concerned if, in the process, halibut, king crab, or other high-priced but relatively scarce species were decimated. Note that neither side is irrational in any sense of the word. From the standpoint of the individual national interest, each country makes good sense in its arguments.

There is, of course, a sound answer to all of these apparently insoluble conflicts. Each argument rests on the assumption that other nations do nothing in return. The race to increase one's share by building more vessels (or larger, faster, or more efficient units) and the frantic scramble to obtain internationally salable fish commodities for foreign exchange purposes are bound to be mutually defeating unless the combined objectives are compatible with the biological limitations on the productivity of the stocks exploited. But clearly, this is not the case. The plans of each

nation for expansion are being frustrated by plans of others to do the same thing. The missing ingredient is the absence of a single authority that can assure compatibility of the production plans of individual and national participants with the yield capabilities of the resources in question.

These are, to be sure, imposing obstacles. But if the questions raised are rephrased in more relevant forms, the prospect for reasonable and feasible policies looks much less forbidding. The first step is recognition that each nation faces a choice--not between what it would like to have and the present situation, but rather between what it might achieve under a second best international agreement and what little it would most certainly realize in the future under the depletion of physical stocks and rapidly increasingly economic cost occasioned by unrestricted entry. In effect, I would argue that there is a substantial bargaining range within which the least acceptable compromise, as viewed by any single nation, would still leave it better off than under a continuation of the present r[illegible] of the high seas fisheries.

If entry to all marine fisheries remains unrestricted, we are faced with two groups of alternatives. On the one hand, we may initiate, under the provisions of the Convention on Fisheries and Living Resources of the High Seas, programs that assure continued physical productivity of these resources (or at least slow down the rate at which that productivity is eroded). To the extent that multinational agreements can be reached under the Convention, they promise some benefit to consumers by assuring a higher output than would otherwise be forthcoming, but they provide no assurance against dissipation of all the potential gains from wise scientific management by the attraction of excessive amounts of fishing gear. If we were wise, honest, and lucky, we might get a repetition of the halibut case; if not, of the whaling fiasco.

The second alternative is to flaunt the Convention and follow either of two courses: destruction of the resource, in an economic if not a biological sense; or unilateral action by the individual coastal states to protect at least some fisheries from this kind of disorderly degradation. As Dr. Chapman has argued persuasively in a number of papers, the creation of a series of national lakes in the open seas offers no real solution to fishery management problems. Apart from the fact that fish appear unable to recognize national boundaries and are likely to be mobile across any that can be drawn, there are many areas in the world in which sensible jurisdictional boundaries simply cannot be drawn by unilateral extension of territorial waters into special fishing zones.

What, then, can be suggested in the way of practical alternatives? It would appear that they must meet the following essential tests: (1) a program geared to a continuing scientific appraisal of the stocks, their yield potential, and the present and prospective adjustment of fishing effort to that potential; (2) analysis of technologically efficient ways of exploiting these resources, using efficiency in the dual sense of the right type of fishing unit and the minimum number of such optimum units required to harvest continuously the proper catch; (3) an orderly method of dealing with potential new entrants; (4) an orderly method of distributing the catch among participating nations.

It must be pointed out at the outset that there exists no basis in science or in economics that will justify objectively any given division of the spoils among present and potential participants in a high seas fishery. But is this necessarily critical? The partially successful management program in the Fraser River salmon case appears to have met this problem head on with reasonably good results. In the case of the Fraser River salmon fishery, the catch is simply divided equally between Canadians and Americans. There is no ground for this--historical, scientific, economic, or anything else. But no one could deny that it has a nice ring of fairness about it that made it more acceptable than any specific technical justification could have done. At the opposite end of the spectrum, one of the reasons for the disaster in the Whaling Convention was certainly the unwillingness of nations engaging in the operation to agree (or adhere) to shares consistent with the productivity of the stocks.

My basic point is a simple one: any attempt to relate specific shares of a managed fishery with scientific findings, economic factors, or any other objective criteria is sheer chicanery. It may be that historical position in the fishery has some real significance, although it would be hard to regard this as more than a starting point for bargaining. But the world is, after all, full of areas of disagreement in which negotiations to reach compromise settlements are successful an overwhelming portion of the time. We would do far better to negotiate the shares as a matter of give and take, regarding the effort as well worthwhile in the interest of achieving far more economic gain from marine resources, than to wrangle endlessly over a scientific basis for the division that does not exist and where such argument is, more often than not, a cloak for the expansion plans of a particular nation or group of nations.

Finally, it is trite but essential to point out that while the difficulties of unscrambling eggs are severe indeed, an omelette can be made by a skilled cook without too much difficulty. In short, very serious problems of equity, national pride, and economic welfare are at stake in the rearrangement of existing fisheries to reduce excess capacity and to put exploitation on a more rational basis. But there are also developing fisheries in almost every part of the world which have not yet reached the position where effort must be reduced to realize a fair portion of the potential net economic yield available. While we are struggling with the more difficult problems of the fisheries already heavily overcapitalized, we should not lose sight of the urgent need to establish rules of the game under which we would prevent the development of such ridiculous situations in those emerging fisheries now in the stages of early development.

DISCUSSION

1. Assuming a program of national quotas for certain species was sought by the United States, why would countries such as the Soviet Union agree to such a scheme? First, because it might limit their present efforts and, second, because within a few years of expanding effort, they might justify an even greater proportion of the total catch than would be justified under the present take. Presumably, under a national quota system the Soviets could catch that portion of the total allotted to them at even less cost per unit than at present, but the total volume might be smaller.

DISCUSSION (continued)

2. Under a national quota system each nation would be free to acquire its share of the total under any system which it saw fit to adopt. One system might be that based on economic efficiency which implies limitation of entry into the fishing.

3. Nations seldom are moved to adopt major changes in their way of doing things unless there is a "horrible alternative" facing them if they continue things as they are. In the case of national quotas it must at least be pointed out that the states involved are considerably better off with, than without, some international agreement.

4. Still another approach to the problem of rational use and distribution of world fisheries is through the development of a regional or world authority that could manage a fishery as if it were the landlord and could lease or license or have auctions for rights to exploit the marine resources. The primary rationale for this is that it would permit an efficient form of exploitation; there would still be the question of distribution of the revenue.

DISTRIBUTION OF FISH RESOURCES OF THE HIGH SEAS: FREE COMPETITION OR ARTIFICIAL QUOTA?

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It is certainly a great honor for a specialist in international law to be invited to talk at this Institute. I am very pleased to be able to arrange my visit here on my way back to Japan from Geneva, where I participated as a legal expert in the work of the Group of Experts on Marine Science and Technology set up by the United Nations in accordance with its General Assembly resolution last year.[1] Today, I would like to talk very briefly about the problem of distribution of fish resources of the high seas. I talked on this subject in 1962.[2] It has been my concern for the past several years.[3] However, I still cannot find any solution to it. Today, I will not propose any solution, but simply put a question for your consideration.

For the past several decades a number of conventions, bilateral or multilateral, have been concluded with a view towards conserving fish resources of the high seas. The idea that a state has a general legal obligation to promote conservation of fish resources was innovated by the Geneva Convention of 1958 on Fishing and Conservation of the Living Resources of the High Seas. This convention, which was adopted by the overwhelming majority of forty-five votes to one with eighteen abstentions,[4] was brought into force on March 20, 1966.

The 1958 Geneva Convention is noteworthy in several respects. First, concrete duties of fishing states are provided for in detail in this convention. A state whose nationals are engaged in fishing any stock of fish shall adopt for its own nationals measures for the conservation of such a stock. If the nationals of two or more states are engaged in fishing the same stock, these states shall enter into negotiation with a view to arriving at an agreement to prescribe for their respective nationals the necessary measures for the conservation of the stock. The newcomer state is to apply to its own nationals the existing measures which have been taken by other fishing states. Secondly, the convention sets forth a new concept of the special interests of the coastal state in the conservation of offshore fish resources. The coastal state, whose nationals may not even be engaged in fishing off its coast, is entitled to participate with other fishing states in any conservation measure applicable to offshore fisheries. Thirdly, the convention has some provisions concerning compulsory settlement of differences among the states concerned. This provision contemplates the establishment of ad hoc commissions, called special commissions, each consisting of five members, who must be well qualified persons being nationals of states not involved in the disputes and specialists in legal, administrative or scientific questions relating to fisheries. The procedure of the special commissions is obligatory and their decisions are binding upon the disputant states. The special commissions so established are empowered to decide upon the necessity of conservation and reasonableness of concrete conservation measures. In a sense, the embodiment of the idea of compulsory settlement of disputes is the most commendable feature of this convention. There is no doubt in this way that the Geneva Convention of 1958 is commendable for the conservation purposes.

In my opinion, however, we are now faced not only with the problem of how to conserve fish resources of the high seas from extinction, but also with the problem of how to distribute them among the nations, each of which naturally wants to maximize its own share even in sacrifice of the interest of other nations. The latter question does not fall at all into the scope of the Geneva Convention, and we should not exaggerate the significance of the convention for solving this important problem relating to the high seas fisheries. I would like to demonstrate this problem of distribution of fish resources among the nations in more concrete ways.

No state categorically objects to conservation measures as the goal of conservation to serve the common interest of all nations. Generally, conservation measures impose their burdens equally upon all signatory states. Each nation complies with the same restriction as to fishing methods made applicable to all signatory powers for the purpose of conservation. It is the actual differences in the fishing technology or economic power of each state and not any legal institution, which dictates the catering catches for each state. Free competition in fishing is not denied within the limitation prescribed on scientific bases in order to promote conservation. The idea of equal access to fisheries and equal limitations on fishing is theoretically fundamental to the conservation program to be provided for in each agreement between the states concerned. The underlying rationale of free competition is one of the basic values endorsed by modern history in many fields. However, the principle of free competition among states was applied only where the demands upon the resources did not overwhelmingly exceed the amount of allowable catch, and conservation measures were imposed in terms of certain restrictions on permissible fishing appliances, fishing seasons, or fishing areas. If a fundamental change in circumstances occurs, each state will undoubtedly be inclined to minimize its own sacrifice and maximize its own share of the resources invoking any reasoning in favor of preferential distribution of resources.

This conflict can best be illustrated by a simple example. If the demand for the catch of a certain species is 150, and prudent conservation practice demands that the total allowable catch be only 100, the burden of abstaining from harvesting the extra 50 will have to be imposed in some way upon the states concerned in exploiting the available 100. Each state can, of course, freely compete in fishing within the total allowable catch of 100. Free competition, however, does not satisfy the states with less advanced technologies and economies, or the states which so substantially preempt the fisheries concerned that fishing by any newcomer will necessarily decrease their own catch. In such cases,

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[1] UN Doc., GA Res. 2172 (XXI), December 6, 1966.

[2] Oda, "Recent Problems of International High Sea Fisheries: Allocation of Fishery Resources," The Philippine International Law Journal, Vol. 1 (1962), pp. 510-19.

[3] See Oda, International Control of Sea Resources (Leyden: A. W. Sythoff, 1963), Part 1, Chapter 2.

[4] Official Records of the United Nations Conference on the Law of the Sea, Vol. II, A/CONF.13/38, p. 139.

conflict between two parties, both of whom may agree upon the desirability of conservation of fish resources, cannot be avoided. One state adheres to traditional arguments of free competition in fishing on the high seas since it considers that its own technology and economy can bring for itself a larger share of the resources, while the other, seeking to assure itself of a constant, preferably large, share of the resources, will invoke all kinds of reasoning in attempting to keep its competitors from exploiting the areas it considers most important. The allocation of limitations has in fact made it difficult and sometimes impossible to compromise conflicting national interests even among those states which are most vitally concerned with the conservation of resources.

In principle, two quite opposite policies are conceivable for the allocation of fish resources of the high seas. (See the table, infra.) The one, which seems still to have a sufficient ground, is to leave all the states to compete in fishing freely among themselves; within the limit, of course, fixed by the conservation consideration.

The other is undoubtedly artificial allocation, as preferential shares for some privileged states such as coastal states or the states entitled to historical titles. The latter policy is materialized in the North Pacific Fisheries Convention of 1952 between Canada, Japan, and the United States,[5] the Northwest Pacific Fisheries Convention of 1956 between Japan and the Soviet Union,[6] some recent arrangements on Antarctic whaling,[7] as well as the Interim Convention on Fur Seals in the North Pacific,[8] in one way or the other. In these arrangements, some contracting parties have been successful in securing preferential shares (sometimes 100 per cent) of the admissible total catch in some high seas areas, or they have agreed upon dividing resources on the basis of a rule which itself is not necessarily based upon the principle of conservation.

In addition, there have been some attempts to generalize such a concept of a preferential share to some specific states under special conditions. The Geneva Conference of 1958 on the Law of the Sea, in connection with the problem of conservation, faced the very difficult questions of allocation of resources. The United States delegate proposed that express rules should be formulated to regulate the practical operation of the abstention formula. But this formula was not approved by the conference.[9] The idea of a preferential share for the coastal state in some special cases was strongly advanced by the delegate of Iceland. This idea found support among many countries of Asia and Latin America, which would have supported any concept in favor of the interests of the coastal state. The proposal was, however, rejected.[10] Nor did the Second Geneva Conference of 1960 produce agreement on a preferential share for specific states. Although there is no common agreement supporting the concept of artificial allocation of fish resources of the high seas, the fact cannot be ignored that the idea of a preferential share for some specific state has met with acceptance among a number of states. I am not closing my eyes to the fact that such a concept will be inevitably brought up, whenever the stock of fish resources is so extensively exploited that intensive regulation such as the limitation of total catch is needed, in order that the fish stock may be properly conserved from extinction.

In spite of these recent trends, however, I hesitate to support any generalization of artificial allocation of fish resources among the nations. I am quite aware that free competition is not the most ideal solution under the present circumstances, when the demands of each nation do not necessarily coincide with its ability. However, it is also true, on the other hand, that the international society does not provide for any supernational authority to assure the states of a fixed and guaranteed portion of the benefit on the reasonable basis in terms of the general interest of the world community. Thus, the concept of artificial allocation itself will not provide for each state concerned a satisfactory middle ground during negotiation on the amount of each share, unless each nation is guaranteed to be entitled to an equitable share of fish resources in the light of the distribution of all other resources which it enjoys. Fully admitting that free competition is not the ideal solution, we should not be in haste, on the other hand, to replace the principle of free competition--a fundamental and well-grounded rationale in modern society--by giving lip-service to the so-called "equitable" quota of fish resources of the high seas. We do not live in an age where there is a common consensus among nations on the general interest of the world community, or where each state is ready to sacrifice its own interest for the benefit of the world community.

I once wrote several years ago, as follows: "Let it suffice for the author to state that the problem of international fisheries cannot be solved solely by legal techniques. This vesting problem will require more comprehensive study by international lawyers as well as by national statesmen than it has received, if it is to be brought to a satisfactory solution."[11] Either because I am too incompetent, or because the problem we face is too complicated, I cannot but repeat today, what I wrote several years ago, without proposing any positive solution.

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[5] UN Treaty Series, Vol. 205, p. 65.

[6] The American Journal of International Law, Vol. 53 (1959), p. 763.

[7] UN Treaty Series, Vol. 161, p. 72; Oda and Owada, "Annual Review of Japanese Practice in International Law, I (1961-62), II (1963), III (1964), IV (1965)," The Japanese Annual of International Law, Vol. 8, p. 123; Vol. 9, p. 120; Vol. 10, p. 74; Vol. 11, p. ___.

[8] UN Treaty Series, Vol. 314, p. 105.

[9] See Oda, op. cit., supra, note 3, pp. 124-27.

[10] Id., pp. 122-24.

[11] Id., p. 142.

TABLE

Conservation	Allocation	
Maximum Sustainable Yield	Free Competition (Whaling Convention in its original form)	
	Artificial Quota	Privileges of states entitled to historic title. Refusal of newcomer states (North Pacific Fisheries Convention of 1952)
		Special status of the coastal state with respect to anadromous fish (Northwest Pacific Fisheries Convention of 1956)
		Special quota for the coastal state (Proposal by Iceland at the Geneva Conference of 1958)
		Equal share for states concerned.
		Others (Antarctic whaling in its present state)

DEEP SEA MANGANESE NODULES: FROM SCIENTIFIC PHENOMENON TO WORLD RESOURCE

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Ten years ago the presence of manganese-bearing nodules on the floor of the deep ocean basins was known to but a few oceanographers. Today, their presence is known not only to geologists, but to mining men, international lawyers, and--through numerous articles in popular news media--to many in the general public. This burst of attention comes with good reason, for what was once a scientific curiosity is being heralded as a potential source of manganese, nickel, copper, and other metals for the world's industries.

But the fact that a metal exists, even in very sizable quantities, is by no means sufficient to make it a resource in the sense that it can be used commercially. Ocean water is a reservoir of all the metals occurring on earth, and one that is freely available to any coastal nation, yet except for magnesium, no primary metal is commercially recovered from sea water. Despite years of experimentation and hope, the oceans remain almost as intractable as they were to the alchemists. The distance from scientific phenomenon to world resource is indeed large.

Clearly, then, the first thing to ask about deep sea manganese nodules is whether there are any grounds for thinking that they might in the foreseeable future make the transition from phenomenon to resource. Anticipating my qualified but affirmative answer to this question, two other general questions follow. We must ask what the characteristics of deep sea mining are likely to be. And we must ask what sorts of institutional arrangements such an operation will need in order to operate equitably, efficiently, and without conflict. The latter two questions are interrelated, but they are distinguishable. Whereas one involves a sort of best guess about the kind of mining operation that is likely to emerge regardless of the international regime, the other involves the choice among those regimes and the influence that each may bear on the efficiency of production and the distribution of returns.

Of course, as stated, the three questions have technologic, economic, and political dimensions. My own limitations even more than those of time preclude a discussion of all of them. In order to emphasize the economic dimension, let me delimit the questions as follows: (1) are deep sea manganese nodules likely to become a commercial resource; (2) what economic characteristics are deep sea mining ventures likely to exhibit; and (3) what institutional arrangements are most likely to promote the economic efficiency of deep sea mining. These three questions correspond to the three main sections of this paper and are taken up in order.

Before proceeding to the questions, an additional prefatory comment is called for. Consideration of the second and third questions would be vital today even if there were only a low probability that deep sea manganese would ever be exploited. I cannot agree with those who say that international law will not and should not be developed until a conflict situation has arisen, that is, until mining has actually begun. It is inconceivable to me that we cannot design institutions that will serve to guide development rather than to follow it. By waiting we may just be abstaining from choice in favor of letting the circumstances of the first few mining ventures determine the results. More seriously, we may be promoting conflict in a world already too burdened with it.

I. Deep Sea Manganese Nodules as a World Resource

What is a "Resource"?

There is no entirely satisfactory definition of the word resource. It does not, on the one hand, imply that a material must be producible at a profit today using present technology, nor does it, on the other hand, encompass all possible sources regardless of how lean or how deep in the earth. As generally understood, the term resources falls between these two extremes; it refers to a material that may someday be exploited given moderate changes in economic conditions and/or reasonably expectable technologic advances.[1]

For our purposes it is convenient to propose a somewhat sharper definition. Let us say that a resource is a material that may or may not be exploitable at today's technology and today's prices, but that is sufficiently close to exploitability that it exerts some influence on price. This added criterion is an attempt to be more specific about the time dimension of the future economic conditions or technologic advances that can make the material exploitable. The effect on price may be direct, as when prices of current sources are forced downward, or it may be indirect, as when business firms begin to consider the new resource in their decision making. Thus, atomic energy had a direct effect on

* This paper was prepared while the author was on the faculty of Berea College, Berea, Kentucky.

[1] Known sources of some metals that are producible at a profit today are called its reserves whereas all potentially recoverable sources of that metal constitute its resource base. This terminology, along with the broad use of the term resources, follows that proposed by Bruce C. Netschert and Hans H. Landsberg in The Future Supply of the Major Metals (Washington, D.C.: Resources for the Future, Inc., 1961), p. 3.

fossil fuel prices long before it became commercial, and oil shale is currently having an indirect effect on the same market.[2] On the other hand, sea water (except for magnesium) and granite are not yet resources; exploitability is too remote.

It is my contention that deep sea manganese nodules are a resource in this sense of having a direct, or more likely an indirect, influence on price, and, conversely, that other alternative manganese-bearing materials are not resources. What is the evidence for such a position? In order to answer, we must investigate two things; the demand for manganese, including both present uses and possible substitutes, and the supply of manganese, including both current sources and potential alternative sources (of which deep sea nodules are only one). Each limb of manganese economics has numerous ramifications, but they must be treated in very summary fashion here.[3]

Manganese Demand

Consider demand first. The main use of manganese, accounting for some 95 per cent of its consumption, is as an additive metal in steelmaking. It serves primarily to reduce a kind of brittleness called hot shortness that is caused by excess sulfur. Common carbon steel contains about one half of one per cent manganese. Substitutes can be found for each of the functions manganese serves in steel, but no other material does so much yet costs so little. Whereas manganese seldom costs more than 4¢ per pound, possible substitutes, such as the rare-earth metals and vanadium, cost upward of $1 per pound. Though it is possible that economies in use will cause the consumption of manganese per ton of steel to decline in the future, all projections indicate a continuing rise in the total demand for manganese because of growth in steel production around the world. Demand, then, looks favorable to the prospects of deep sea mining or of other alternative manganese resources.

Manganese Supply: Current Sources

Turning to the supply side, however, we find a different picture. Current sources of supply, i.e., existing mines, appear quite adequate. Modern manganese mines contain vast quantities of high-grade, low-cost reserves; they can continue to produce at high rates for many years to come. In fact, the newer mines are really little more than earth-moving operations in which enormous beds of near-surface manganese ore are recovered by bulldozers and, after some concentration, are moved directly to a port. True, some of these mines have cost as much as $100 million to bring into production, but they contain so much ore that it is doubtful whether the investment per ton of reserve is any higher than it was in the past. In sum, while the demand for manganese is strong, there is no present need to turn away from current sources of supply unless and until one of the alternative sources turns out to be as cheap as, or cheaper than, conventional mines.

Manganese Supply: Alternative Sources

With these projections in mind, we are in a position to consider alternative sources. Generally speaking, there are two sorts of potential resources for any mineral commodity. First, there are low-grade sources that are similar to deposits being mined today but in which the metal is less concentrated. Second, there are non-conventional sources from which metal has not in the past been commercially recovered. Low-grade sources of manganese in this country include deposits in Maine, South Dakota, Arizona, and Minnesota. There are also at least two non-conventional sources: manganese-bearing slags produced as a waste product during steelmaking and the deep sea nodules.

At the risk of some oversimplification, the prospects for secondary recovery from slags and for mining low-grade deposits will be dismissed with just a few sentences. The possibility of secondary recovery arises because the open-hearth process of steelmaking is so inefficient in its use of manganese that slags may contain more than 10 per cent manganese. Unfortunately, despite the fact that this source is found right at steel plants, the silicate metallurgy of a slag requires special refining procedures that significantly raise the costs of recovery. Moreover, the basic oxygen converter, to which steel makers are rapidly switching, is far more efficient in its use of manganese, and B-O-F slags rarely contain more than 5 per cent manganese. Much the same conclusion applies to the low-grade deposits. While a small

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[2] The active market and rising prices for privately held parcels of oil shale land in Colorado provide evidence of this indirect effect. As a matter of fact despite their completely different geology and geography, the economic similarities between deep sea manganese and oil shale are marked. Both have been known for some time but never successfully exploited; deposits of each can be delineated relatively easily so that greater uncertainty attaches to recovery methods than to the resources; both will require large capital investments before exploitation is possible; and neither is likely to attract any but the largest firms. These common economic characteristics, which will be discussed below for the nodules, suggest that there may be similarities in the public policies applicable to oil shale and to deep sea manganese.

[3] For a more complete discussion of these aspects of manganese economics, see David B. Brooks, Low-Grade and Nonconventional Sources of Manganese (Baltimore: The John Hopkins Press for Resources for the Future, Inc., 1966). This book represents a pilot study designed to see whether it was possible to clarify the concept of resources for the case of a single mineral commodity.

manganese mining industry has existed in this country from time to time, largely as a creature of artificially high prices during war time or stockpiling programs, none of the low-grade deposits has ever produced on a commercial basis. In fact, cost of production data, based on many years of experimentation, are similar for the two sources. Using the cheapest of the tested processes, and allowing for further technologic progress, it would cost the United States about $1 extra per ton of steel (an increase of more than 1 per cent) to turn either to domestic deposits or to slags for our manganese.[4] Thus, the cost of using strictly domestic sources of manganese would turn out to be a significant cost to the economy. Though a considerable sum was spent by the government to investigate slags and low-grade deposits, the major rationale did not derive from any feared resources shortage but from the security problem posed by our dependence on foreign manganese mines. For a number of reasons, the security problem carries less weight today so an alternative source must prove itself commercially or not at all. In short, neither the low-grade deposits nor the slags appear to be resources in the sense defined above: their effect on manganese prices or on decision-making by manganese firms is nil.

What about deep sea nodules, then? Are they an alternative whose costs of production are close enough to high-grade onshore reserves that they can be considered as a manganese resource? In contrast to the situation just described, there are grounds for being less skeptical, so let us look at the evidence more carefully.

For one thing, the nodules are attracting considerable attention from industry, which was never true of the slags or low-grade deposits. Quite a number of American firms have already invested funds in research on the geology of the nodules and a few on possible mining techniques; others are studying processing techniques. Within the past year the existence of a "smooth, black pavement" of nodules on the Blake Terrace off Southeastern United States has been reported. Alumineut, a deep-diving research submarine, rode on its wheels along the deposits and recovered samples that were said to be better than minimum commercial grade for manganese ore.[5] Other relatively high-grade nodules were recently discovered on the continental shelf only fifty miles northwest of Vancouver, British Columbia.[6] Another area of research suggests that separation of the various metallic constituents of the nodules may not be as difficult as was once supposed. Studies by Furstenau, for example, give grounds for hope that relatively simple processes may make a multi-product operation feasible.[7]

Of course, few of the firms supporting research on the nodules are really potential deep sea miners, but this is not the point. Deep sea manganese is beginning to figure into their decision-making. Moreover, firms in other countries, notably Japan, Australia, the United Kingdom, and the Soviet Union, are conducting similar studies.

I would also maintain that the very fact that conflicting opinions are expressed about the value of deep sea nodules indicates that they must be taken seriously. If someone suggested mining the moon, it is doubtful that anyone would respond with figures on the adequacy of conventional reserves. Such responses, which abound for deep sea nodules, are generated only for reasonably possible alternative sources. Almost from the original publication of engineering cost estimates by John Mero in 1959, the feasibility of deep sea mining has been a matter of controversy.[8] While the quality and quantity of metalliferous material in deep sea nodules is enough to make any landlubber-miner green with envy, simple comparisons neglect the many problems that must be overcome before production is technologically, to say nothing of economically, feasible. Depth of overlying water of course tops the list. Despite their high grade in many places--they run up to 50 per cent manganese plus several per cent of copper, cobalt, and nickel--the richest nodules tend to occur in the deepest water. There is no proven technique for recovering large quantities of material from such depths. We have had only limited experience with hydraulic dredging, the most commonly suggested technique, and still less with the thousands of feet of hose and problems of positioning that full-scale mining would entail. Nor, even given the studies noted above, is the technology available to cope with the fine grain size and intimate mixture of metals within a nodule.

Despite all of these qualifications, investigation of as much cost information as I could obtain led me to conclude that deep sea manganese nodules are the only potential resource that might be exploited in the near-to-middle-term future, and that to a considerable extent they already influence business decisions.[9] This does not mean that recovery of manganese from the oceans is today competitive with recovery from high-grade ore deposits of the conventional type. Until deep sea mining is actually attempted, the question of competitive standing must remain unresolved. However, it does mean that research on the possible exploitation of deep sea nodules has gone far enough to make them the lowest cost alternative manganese resource of any size, and hence far enough to put a firm ceiling on the long-run price of manganese--and perhaps of cobalt and nickel as well. The price cannot rise higher than the cost of production of the nodules. Indeed, future prices could well be lower than today's prices if deep sea mining becomes a reality.

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[4] Ibid., pp. 63-92, 111-13.

[5] Engineering and Mining Journal, Vol. 167 (September, 1966), p. 156.

[6] Mining Engineering, Vol. 19 (March, 1967), p. 20.

[7] D. W. Furstenau, A. P. Herring, and H. Hoover, "Leaching Manganese Nodules from the Ocean Floor," Paper presented to 1967 Annual Meeting of the American Institute of Mining, Metallurgical and Petroleum Engineers (AIME), Los Angeles, California. See also Engineering and Mining Journal, Vol. 166 (April, 1965), p. 112.

[8] John L. Mero's work and projections are most fully presented in his book, The Mineral Resources of the Sea (New York: Elsevier, 1965). For a more recent "progress report" by Mero, see "The Future of Mining the Sea," Oceanology International (October, 1966), pp. 73-8. Two of the best statements that question the prospects for deep sea manganese are as follows: Chester O. Ensign, Jr., "Economic Barriers Delay Undersea Mining," Mining Engineering, Vol. 18 (September, 1966), p. 59; and T. N. Walthier, Paper presented at the 1967 Annual Meeting of the AIME, Los Angeles, California.

[9] Brooks, op. cit., pp. 93-108, 120-22.

II. Economic Characteristics of Deep Sea Mining

The second of our three questions asks about the economic characteristics of an ongoing deep sea mining industry. While we cannot pretend to clairvoyance, enough is known about the problems and the opportunities to derive some tentative but important conclusions. Let us consider first those aspects related to a single operation, and then those that will become important when competition develops for deep sea sources of supply.

The Deep Sea Mining Firm

So far as each individual mining venture is concerned, the foremost consideration is the high initial investment. Figures ranging from $30 to $300 million have been suggested as the amount necessary to bring a deep sea mining operation plus associated onshore processing facilities into production. The appropriate figure is probably in the neighborhood of $100 million.[10] Certainly this is high; but, neglecting any risk premium, the large volume of material that would be available to a single ship means that the investment per ton of reserves is no greater than that for an onshore mine. Moreover, it does not appear that investment cost is very sensitive to scale; a 2,000 ton per day operation is not much cheaper than one designed for 5,000 to 10,000 tons per day. In fact, indications are that investment per daily ton is still declining at 10,000 tons per day.[11]

In partial compensation for the high initial investment, a deep sea mining operation should entail relatively low operating costs. Indeed, given the initial investment and the risk, a mining system will have to promise low operating costs if it is even to be considered. Again, published estimates are highly controversial. But two factors stand out. First, unit operating costs at all stages of production go down with increases in output. For example, the cost per ton of moving solids through a hose, as from the ocean bottom to a ship, decreases sharply over considerable ranges of throughput. Second, unit operating costs for the more likely recovery systems increase only slowly with depth. Mero has estimated that direct mining costs for a hydraulic dredge will range from about $2.25 per ton in 1,000 feet of water to $4.25 per ton in 15,000 feet.[12]

The twin factors of high investment cost and low operating cost suggest strongly that each deep sea mining venture will have to be relatively large in scale. Only at high rates of production can such investments be amortized in an acceptable length of time. Typical rates will almost surely not be less than 2,000 tons of nodules per day, and they could be 10,000 tons per day. Some 20 to 50 per cent of this tonnage will be recoverable metal, which places each deep sea mining operation at the scale of the largest onshore mines.

Under these conditions it is impossible to ignore the effect of scale on the prices of the outputs. Estimates based on current consumption rates in the United States indicate that a ship with an output of even 500 tons per day would cause the price of cobalt to fall and that at rates of 2,000 to 5,000 tons per day the prices of nickel and manganese would also have to fall in order to clear the market.[13] Without going into detail, the implication is that gross revenue will be considerably less than if current prices could be assumed to remain constant after deep sea mining begins. Of course, the price effect of any one deep sea mining venture would diminish over time as consumption rates increased; on the other hand, pressure on prices would increase if this one venture proved successful and competitors entered the field.

To some extent the potential price effect may moderate the tendency to build large-scale mining systems. However, it is less likely to moderate a tendency to use fully whatever capacity is available. Near-capacity rates of production are typical of systems characterized by high investment and low operating costs, particularly if unit operating costs continue to decline over most of the range up to full capacity. The object is to recover more of the investment in any time period by taking advantage of the low cost of additional units of output. Such action can be carried so far that markets are totally disrupted and the resource is quite incompletely recovered. Of course, profits are apt to be minimal under these conditions, but as Christy has pointed out, even if prices are depressed because of overproduction, the anticipation of future returns might well be sufficient to induce nations to establish claims and operate them even though present returns were unsatisfactory.[14] While it is not difficult to develop institutions to prevent a race to acquire claims on the ocean bottom (see page 38), this does little to control overcapitalization of and over-production from the claims that are acquired. This difficulty almost inheres in the nature of the resource.

Competition Among Deep Sea Mining Firms

Turning now to the broader economic conditions that will develop if deep sea mining proves successful, we can identify a number of important corollaries to the points just discussed, corollaries that relate both to considerations of economic efficiency and to those of income distribution.

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[10] Brooks, op.cit., p. 99 and references cited there.

[11] Based on data given by Mero, The Mineral Resources of the Sea, op.cit., pp. 268-70.

[12] Ibid., p. 290; the assumed production rate is about 4,000 tons per day. See also H. D. Hess, "The Ocean: Mining's Newest Frontier," Engineering and Mining Journal, Vol. 166 (August, 1965), pp. 95-6.

[13] Brooks, op.cit., pp. 103-7. Specifically, the estimate was that a single ship recovering 2,000 to 5,000 tons per day of nodules containing 35% manganese, 0.5% cobalt, and 2% each of nickel and copper (a relatively rich nodule, but one that might be respresentative of the first type mined) would force manganese prices down to about 2-1/2¢ per pound, cobalt to $1.00 per pound, and nickel to 65¢ per pound. These estimates were based on the price-consumption relationships as they existed about 1964. They resulted in a one-third reduction in annual gross revenue.

[14] Francis T. Christy, Jr., "Alternative Regimes for the Minerals of the Sea Floor," Proceedings of the American Bar Association National Institute on Marine Resources, June 8, 1967 (in press).

Largely because of the high investment cost and large scale, we can assume that the number of mining operations will be limited, at least initially. Certainly rapid expansion into deep sea mining itself, as distinct from simply asserting the right to mine, is improbable. Moreover, only firms in the most highly developed nations will have the combination of technical ability and financial capacity to mount a deep sea mining venture. Even there, joint ventures to increase capability and reduce risk are to be expected. Oligopoly, if not monopoly, will be the rule, and the resulting concentration of economic power must raise anew all of the old questions about the balance between gains in the efficiency of production and losses in the force of competition. It is unclear where the balance can or should be struck, though it is obvious that it will be far from that which currently obtains for the fishing industry.

Actually, in terms of the producing firms, all of this will entail just a continuation of past trends. Most of the metals recoverable from deep sea manganese nodules are recovered today by a relatively small number of concerns from the advanced countries: western world nickel production is dominated by a single firm, and cobalt and copper production by a dozen or so; manganese production has also tended to become concentrated over the past twenty years. The only new factor will be the entry of other than traditional mining firms into the production of primary metals.[15]

If the nationality and structure of producers is not likely to change radically with the advent of deep sea mining, the nationality of production may change sharply. With the exception of those in the Soviet Union, all of the major manganese deposits of the world occur in the developing nations. From India to Brazil to Morocco to Gabon, manganese ore provides up to 5 per cent of the export earnings of developing nations. This may or may not create a problem. Deep sea mining could develop so slowly that no country would lose its export markets. Even with rapid expansion into the oceans, the deposits in certain nations, Gabon for example, are so rich and so large that they probably would not suffer from the competition. On the other hand, the deposits in Ghana, Morocco, and India are more vulnerable; manganese export earnings for these countries could be cut to zero if sea floor manganese proves commercially attractive.

Obviously, the exact distribution of gains from deep sea mining among the nations of the world will depend upon the international regime finally adopted. Several groups with divergent interests can be readily identified. Unfortunately, we cannot go further into these matters without straying beyond my self-imposed limits, though it is clear that they will have much to do with the political feasibility of any proposed regime.

However, one other aspect of the economics of deep sea mining deserves consideration at this time, viz. valuation of the resource. This becomes a problem only to the extent that the resource is limited. If a resource is essentially limitless in size, its in-place value drops to zero because there is no need to compete for it. This is the case for ocean water used as an industrial input in most locations. It is not likely to be the case for deep sea manganese nodules. The oft-repeated statement that nodules are forming on the ocean floor at a rate faster than that at which the world is consuming manganese is not really of much practical importance. We don't mine the ocean bottom; we mine some small portion of it. Sea floor manganese deposits vary greatly in grade, pounds of nodules per square meter, depth of overlying water, and bottom conditions.[16] They also vary in distance from markets and from supply ports, as well as in the number of days of good weather that can be expected at the surface. In this respect manganese nodules are not so different from fish. Despite the enormous mass of fish in the ocean, the demand is for certain species, and they are sought in areas where the cost of hunting them is relatively low. For manganese, certain nodules in certain localities will offer the best commercial opportunities, and competition will develop for these deposits.

Therefore, as deep sea mining is shown to be first technologically and then economically feasible, the deposits themselves will come to have value, or, to be more specific, the rights to mine the deposits will come to have value. The valuation process will take note of all the factors suggested above involving quantity, quality, and location. In fact, if a market for deep sea mining rights were established with enough buyers and sellers, the value determined for each section of the ocean bottom would approximate the capitalized value of the net returns obtainable from exploiting the deposit. The higher the expected returns and the lower the expected costs of production, the higher would be the value of the deposit.

Of course, with a new resource the valuation process will be highly approximate. But the difficulties of estimation should not be overstated. In contrast with most mineral deposits, manganese nodules occur as a surficial layer (so far as the ocean bottom is concerned). They are visible to a TV camera, and it may prove simpler than we now imagine to make the necessary estimates. The uncertainties about mining and processing are likely to be greater than those about the resource itself.

The valuation process is of critical concern because it has to be operating correctly for production to be efficient. It is the very lack of a market for fishing rights that has led to the inefficient use of inputs by the fishing industry, and the inefficient delivery of outputs to the consumers. But how can a market be developed for manganese deposits on the ocean bottom, or alternatively, what mechanism can we find that will substitute for a market? These are matters to which we must now turn.

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[15] As Thomas A. Wilson, among others, has pointed out, the lead into deep sea mining is being taken by petroleum and chemical firms. "Undersea Mining: Where Do We Stand Today?," Engineering and Mining Journal, Vol. 166 (May 1965), p. 83.

[16] Mero, The Mineral Resources of the Sea, op.cit., pp. 127-241; "Strategic Location is Key Factor in Marine Mineral Recovery," an interview with Walter H. Hibbard, UnderSea Technology (January 1967), p. 47.

III. Institutional Arrangements and the Efficiency of Deep Sea Mining

Production of manganese from the ocean bottom will involve a series of operations beginning with exploration and ending with transportation to processing and consuming plants located onshore. Whatever regime is designed must accommodate all of these steps, and must do so in a way that will permit production to be efficient, distribution of returns to be equitable, and conflicts to be avoided. It goes without saying that the regime must also be politically acceptable to enough nations to insure wide acceptance. A number of authors have discussed possible regimes in just these terms.[17] The suggestions range from a sort of laissez-faire flag nation or rule-of-capture approach through nationalization of the ocean bottom (perhaps by extension of the continental shelf doctrine) to internationalization under the aegis of the United Nations or some other international agency.

While it is tempting to slide off into discussion of the enormous issues posed by the alternative regimes, my comments will, as noted initially, be restricted to institutional means for achieving economic efficiency. (By efficiency I mean the relationship between the value of all inputs and the value of useful outputs, and the attempt to increase the latter relative to the former.[18]) In any event, I have already expressed my personal preference for an international approach, though largely on grounds other than those of economic efficiency.[19]

Any regime for deep sea mining must incorporate two fundamental principles. Northcutt Ely has stated the first as follows: "The petroleum and mining industries, whether operating on dry land or beneath the sea, require...above all...the discover's exclusive right to exploit the minerals discovered and security of tenure while he does so."[20] Second, the mineral industries require assurance that no special advantage or disadvantage will be granted to those mining in any particular environment.

The principle of exclusive rights is so fundamental to efficient mining that the industry often neglects to elaborate upon it. Apart from exclusive rights there is no way to insure that the returns from exploration accrue to the discoverer, hence no way to attract capital to the exploration effort nor any way to prevent the common property dilemma that bedevils fishing. If exclusive rights were not available one company could wait until another had done the needed exploration and then, having avoided these costs, move in on the deposit and operate in the same locale. Ignoring the obvious problem of conflict, it is easy to visualize problems of congestion with equipment forced to operate at less than optimum levels of productivity or safety. Moreover, the tendency to mine as fast as possible or to "high grade" would be aggravated by the need to reap the benefits of mining before another firm obtained them. But for materials like manganese deposits that are fixed in position and cannot move across arbitrary property lines, these problems cannot arise once exclusive use rights are made available. (It is because they are not fixed in position that common property rather than exclusive rights apply to fisheries and that additional forces, such as unitization, must be applied to make exclusive rights applicable to fluid minerals like petroleum and gas.)

The principle that deep sea deposits be treated equally with other sources of supply is also worthy of elaboration. The point is to avoid either subsidizing or burdening deep sea mining. Every economic system strives to conduct its affairs in such a way that its demands are met at minimum cost. Indeed, one of the advantages of having a variety of alternative resources is that society can choose that source that requires the least value of inputs per unit of output. An accurate choice is possible only if costs reflect the actual social value of inputs, and this will not be the case if one resource is subsidized by receiving underpriced inputs while another is burdened with overpriced inputs. Note that this principle implies nothing about the level of taxes or subsidies; it only says that whatever taxes or subsidies exist should be applied equally to all sources. Of course, no system attains this goal, but it is one toward which a regime should strive.

Beyond the basic requirements of exclusive rights and equal treatment, there are other institutional forces that will affect the efficiency of a deep sea mining industry with the economic characteristics discussed in the preceding section. We can divide them into three groups: the direct conditions associated with exclusive exploration and exploitation rights; the method for dealing with the indirect or external effects of exploration or exploitation; and the method of charging for exclusive rights. Each of these forces will be treated as if rights to mine deep sea manganese were obtainable under some lease arrangement. This is not only a matter of convenience but also because it is reasonable

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[17] Numerous discussions have been held during the past few years on alternative regimes for the high seas and for the bed of the sea beyond the continental shelf. Notable were those at the First Annual Law of the Sea Institute in 1966 and at the American Bar Association National Institute on Marine Resources in 1967. The Proceedings of the former have been published by The Ohio State University Press as The Law of the Sea: Offshore Boundaries and Zones; the Proceedings of the latter are scheduled for publication late this year. See also Francis T. Christy, Jr., and A. D. Scott, The Common Wealth in Ocean Fisheries (Baltimore: The Johns Hopkins Press for Resources for the Future, Inc., 1966); and William T. Burke, Ocean Sciences, Technology, and the Future International Law of the Sea (Columbus, Ohio: The Ohio State University Press, 1966).

[18] F. H. Knight, The Economic Organization (Chicago: University of Chicago Press, 1933), p. 8. Knight's formulation of efficiency was the ratio of useful output to total input.

[19] Francis T. Christy, Jr., and David B. Brooks, "Shared Resources of the World Community," in New Dimensions for the United Nations (Dobbs Ferry, N.Y.: Oceana Press, 1966), pp. 153-65. Christy has put forward arguments to the effect that internationalization would also tend to be more efficient than alternative regimes, "Alternative Regimes for the Minerals of the Sea Floor," op.cit.

[20] "The Laws Governing Exploitation of the Minerals Beneath the Sea," Exploiting the Ocean, Transactions of the Second Annual Marine Technology Society Conference (Washington, D.C.: Marine Technology Society, 1966), p. 377.

to think that wherever ultimate control is vested, the actual mining concern will end up securing leases from that body. Most mining and petroleum firms are familiar with leasing arrangements on the public domain in the United States and in foreign countries. They presumably expect something of the same kind in deep ocean basins.

In addition, some sort of international agreement is assumed. There must be some set of international rules of the game that exploiters and non-exploiters alike can look to with assurance. Without rules accepted by most nations, the inevitable result would be uncertainty, whereas economic efficiency demands as much certainty as possible.

Direct Conditions of Leasing[21]

Assuming some form of lease system is to be set up and that it will have the respect of most of the world community, how can the leases be designed so as to promote efficiency? First, the system could be designed with just exploitation leases or with both exploration and exploitation leases. Under the former system each interested firm would undertake exploration efforts freely and then act on the basis of this proprietary information in trying to win exclusive exploitation leases. This is the arrangement currently in effect for offshore oil in the United States. Alternatively, the leasing body could offer exclusive exploration leases, presumably with the usual provision that specified fractions of the tract be returned to public ownership at set intervals, but also with the privilege of converting some fraction to an exploitation lease. This is the arrangement used by many underdeveloped nations. The choice between the two will probably depend upon how well the resource comes to be known before exploitation is imminent.[22]

Second, any lease should be limited in area. The sea floor is a definable surface so that establishing boundary lines between leases will give rise to no serious technical difficulties. The size of any one lease should probably not be fixed but depend upon estimates of the quantity and quality of the resource available. The minimum size of the lease would be determined by the room needed for technologically efficient recovery of minerals from the bottom under ideal circumstances. Less than ideal circumstances would justify a larger area. Exploration leases, if used, should cover much more area than exploitation leases.

Third, the lease should be valid only so long as the company needs it to explore for or exploit the resource in question. On the other hand, assuming that the lessee does not violate any of its provisions, a lease should be renewable so long as work continues.

Fourth, a performance requirement should be included. This establishes some period of time within which exploitation must commence (or within which a specified expenditure must be made for exploration). Otherwise the lease is cancelled. The object of a performance requirement is to prevent firms from acquiring and indefinitely holding leases for speculative purposes. They are common to almost all lease or claim systems, and they are effective to the extent that the time or money required to satisfy them is a real barrier to "sitting on" a claim. The performance requirement takes on an added importance with a new resource such as deep sea manganese nodules. The absence of an effective performance requirement would practically invite a race to claim areas of potential value on the sea floor. Such a race would be inefficient in the extreme. It would require that capital and manpower be devoted to establishing claims on these resources before they are really needed by the world community. Total inputs would be greatly in excess of those needed for orderly development. Performance requirements do have the disadvantage that they contribute to the tendency toward excessive rates of production, but this is a problem that must be dealt with by separate techniques.

Finally, some procedure--it matters little which--must be established for dealing with boundary line disputes. Again, efficiency is easily obtained for stationary resources like manganese nodules. If some adjustments are necessary, equitable divisions can be worked out much as the more complex boundary line disputes in petroleum have been settled.

Indirect Effects of Use

The second of the institutional forces that will influence the economic efficiency of deep sea mining involves the methods for dealing with the indirect or external effects resulting from exploration or exploitation. Efficiency is not so obvious a goal as it sometimes seems. For example, the goal of minimizing total cost for each level of output should refer not just to the cost of the mining firm itself but also to any costs that the mining activity may impose on

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[21] A number of the points in this section lean on the presentation by L. F. E. Goldie, "Geneva Convention on the Law of the Sea: The Need for Future Modifications," The Law of the Sea: Offshore Boundaries and Zones, op.cit., pp. 273-93. My only significant point of disagreement with Prof. Goldie concerns the possibility of a mining firm operating outside of the accepted regime, which he would permit at the option--and at the risk--of the firm. But the goal of reducing uncertainty suggests that whatever international regime obtains for one firm should obtain for all. The problem might be minimal if a few small concerns elect to operate outside of the international regime. It would seem more likely that the most powerful firms would exercise this option, in which case the regime could find itself nearly powerless.

[22] Under a third possible arrangement, the leasing body itself would conduct the exploration effort and then make the information available to any interested party. This arrangement would provide a significant economy in exploration expenditures, and might promote competition by reducing both risk and initial investment. However, it is unlikely to appeal to mining or petroleum firms and would place enormous burdens on the leasing agency.

other economic units. Similarly, any benefits conferred by mining (as, possibly, fish nutrients brought to the surface) should be counted as part of its output. Such external costs and benefits arise because of technologic interdependencies among inputs and outputs, so that one economic unit can force another to operate at higher or lower levels of efficiency than it would if operating alone. There are two common sorts of interdependencies that we may distinguish, though they both reflect the same economic forces. The first involves multiple demands for the same resource and the second, pollution.

Multiple demands arise when several valuable resources occur within the same vertical segment from ocean floor to ocean surface. For example, manganese deposits and preferred routings for submarine cables could lie in the same area, and a busy shipping lane could lie directly above both. On efficiency grounds we should allow for that use or combination of uses which will generate the highest net returns (or, in economic terms, that will maximize rent). A useful way to conceptualize the problem of selecting among multiple possible uses so as to maximize net economic returns is to ask what one operating unit would do if it owned all the resources in question. If multiple use would be inefficient or dangerous, the regime should be prepared to reallocate use rights on this basis or to permit use rights to be "bid" from one application to another. It may, for example, be preferable to prohibit mining in certain areas if surface traffic is very heavy and cannot use an alternative route without major cost increases; in other areas manganese deposits may be so valuable that it will be worth moving submarine cables to get at them. In many, perhaps most, cases it will be possible to work out some form of accommodation so that both activities can co-exist. Of course, there is nothing to force a regime to allocate by returns; first-come first-serve is another rule that could be followed. All that can be said is that any system other than one based on net returns will reduce economic efficiency below what it could be.

The other common external effect is pollution. This is also a matter of multiple use, the added demand for use of the sea for waste disposal. However, in contrast to the cases just presented where the benefits of resource use are shared, pollution is the process by which costs are shifted from one resource user to another. The technologic interdependencies associated with pollution are obvious. Waste disposal by one economic unit transmits physical substances to other units. Pollution may, for example, destroy a fishery or a beach, in which case the returns to the miner are higher than they should be and those to the fisherman or the beach user lower than they should be.

Certainly, exploration and exploitation leases should include clauses to deal with pollution. Since the shifting of costs resulting from transmission of pollutants takes place outside the market system, the solution is to redistribute costs so that the effects of waste disposal come to bear on the mining firm's accounts books. One method for accomplishing this involves establishment of a charge or tax related to the damages imposed on other economic units by the pollutants. In effect, this "internalizes" the cost in the same way that benefits were treated by assuming they all accrued to the same firm. Mining firms might react to a pollution charge by reducing waste disposal volume by changing it to a less noxious form, or by paying compensation to those injured. Whatever its decision, the point is that in a strictly private framework the control of pollution is not economically attractive, but that it becomes so when all costs in the system are taken into account.

Cutting across both aspects of indirect effects is the problem of values, for market prices are not always adequate reflections of social values. We can only note the problem here, for the question of how to measure values in the ocean is worthy of separate discussion. Clearly, many approximations will be necessary, but difficulties may be mitigated by the absence of large intangible values on the high seas. Losses in recreational benefits and natural beauty and changes in ecology do not seem likely to be widespread. However, this is just a guess. It could be that deep ocean mining will so stir up bottom conditions that it will produce quite unexpected tangible and intangible effects. Recent experience with oil spills should, if nothing else, teach us to be agnostic on such matters.

Charges for Exclusive Rights

The final area we must take up is the matter of charges for exploration and exploitation rights. As before, emphasis will remain with the impact of such charges on the efficiency of production rather than with the matter of who receives the payment. Actually, it may not make much difference to the potential miner whether he makes payments to his own country, to some other country, or to an international agency. He is almost sure to pay something, even if it is no more than a nominal fee for protection.

However, the principle of equal treatment of all resources suggests that the leasing authority, whatever it is, charge more than a nominal sum for exclusive rights. If it does not attempt to extract fair market value (which admittedly may be very low or even nil at first), an unfair advantage would accrue to ocean mining firms compared with firms that must pay for rights to mine similar resources on shore. As a result, capital and labor inputs would tend to be inefficiently allocated between onshore and offshore areas, as well as among various offshore areas. If exclusive rights to deep sea resources are too highly priced, exploration and exploitation will be deterred and other deposits will be used though they are higher cost sources. If exclusive rights are priced too low, there will be a tendency for excess inputs of capital and labor to move into deep sea mining in order to reap the returns, thus aggravating the problem of high rates of production that may result just from the economic characteristics of the mining operation.[23]

How can the value of exclusive rights to this resource be determined, and how can a mechanism to charge for these rights be set up? These two questions are inseparable. If we can find an appropriate mechanism for capturing revenues, we will have at the same time found a way for determining their value. There is no one best solution, but some suggestions seem in order.

First, it would be useful to distinguish between charges to cover the cost of administering a deep sea regime from charges related to the market value of exclusive rights. The former is a cost of operation that ought to be borne by those who benefit from it. That is, there will be certain public costs associated with recording leases, protecting them, and dealing with boundary disputes. These costs could be expressed in terms of an annual rental per square mile of

[23] See also page 35.

ocean bottom, such rental to be fixed for all parties so as to just cover the public costs. Alternatively, public costs could be covered by a license fee, a system that would be more appropriate if the largest share of the costs occur upon establishment of the lease rather than being distributed over its working life.

Second, the possibility of external effects suggests that a bonding system be developed. Such a system would require that firms desiring exploration or exploitation leases establish a fund large enough to pay for external damages. In the event that prescribed pollution-control procedures were violated or that unexpected damages occurred, the fund could be used to reduce the pollution or compensate those who have suffered from it. If no damage occurred, the bond would be returned to the firm upon termination of the lease. Bonding arrangements are commonly a part of mining regulation, particularly with surface mining for coal in eastern United States. The needed pollution-control measures, the appropriate size of the bond, and the conditions under which it would be forfeited could only be determined from experience.

Third, and most difficult, a system is needed to establish and collect the market value for exclusive rights.[24] A number of techniques are possible including various kinds of bidding, appraisal prices, royalties based on flat or sliding scales, tax systems, and similar forms. Each technique requires that somebody have authority to dispose of exclusive rights and that it either offer specified portions of the bottom or permit firms to suggest the areas to be put up for auction. Each also requires that the criterion for awarding leases be unambiguous so that no question can arise as to which firm made the best offer. My suggestion is for a sealed-bid auction in which bids are made in the form of a gross production tax or royalty.

Sealed bidding is strongly recommended because under the competitive conditions to be expected with deep sea mining, it is more likely than open (oral) bidding to yield true market values. The number of bidders is apt to be small, but based on his studies of sealed bids by oil and gas firms operating on the continental shelf of the United States, Walter Mead reports that "even where...a lack of bidder interest, rather than collusion, results in one-bidder sales under sealed bid procedures, such sales may yield a price close to a competitive price,..."[25]

Mead also suggested that the structure of the industry should be considered when selecting a bidding practice. Sealed bids are generally more appropriate for conditions where large capital investments are necessary and consequently where bidding is apt to be oligopsonistic. This conclusion is reinforced for industries that have alternative sources of raw material, that operate on the basis of long-lived leases, and that expend relatively large sums in exploration efforts.[26] These characteristics practically describe deep sea mining. Thus, there is every reason to think that the sealed bid auction is appropriate.

Mead also suggests that a refusal price that "realistically reflects competitive prices becomes more important as the structure of the buyer industry becomes more concentrated (oligopsonistic)."[27] However, as he also points out, for some resources it is very difficult to establish realistic refusal prices, this is certainly going to be the case for deep sea mining, at least for some time to come. If at some point it becomes possible to rapidly survey deep sea manganese deposits and estimate production costs, minimum acceptable prices may become appropriate. For the time being, the minimum acceptable price should simply be the rental charge noted above to cover direct public costs.

The uncertainty surrounding the value of the resource also leads to the suggestion that a yield tax or royalty system rather than a bonus payment system be utilized. A bonus must be paid upon securing the lease and regardless of whether the venture turns out to be profitable or even possible. With a new resource of uncertain value, there is reason to avoid introducing added initial costs. It is preferable to wait until production has actually begun and at that point tax output. The absence of a bonus may also induce a larger number of bids because the investment, hence the risk, is not increased by an initial payment.

Yield taxes can be designed in two ways, as a profit sharing (net income) tax or as a royalty (gross production) tax. Economic theory lends support to the former because it does not affect the costs or the rate of production. If there are no profits, no tax needs be paid. However, there are also some disadvantages. Net income is often difficult to determine, particularly for a single operation of a complex organization, and the problems of international policing appear unmanageable. In contrast, unless production can be hidden, which is not likely to be the case for ocean mining, gross production is so apparent and the tax so easy to estimate that there could be little question of whether the correct amount was being paid. The royalty bid would vary from firm to firm because of their different situations and expectations. At least initially when lack of competition would keep the bid low, the effect on cost of production should prove minimal. Whatever economic losses occur might well be counterbalanced by the gain in convenience and economy for both operating firms and collecting agency.

IV. Conclusion

The initial section of this paper developed the idea that manganese is a resource in the sense that it is beginning to have an impact on both public and private decisions about future sources of supply. While it may not be economic to mine the nodules at present, analysis of alternative manganese resources indicates that they are close enough to

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[24] Many of the suggestions in the following paragraphs are based on a fine article by Walter J. Mead, "Natural Resource Disposal Policy--Oral Auction vs. Sealed Bids," Natural Resources Journal, Vol. 7 (April 1967), pp. 194-224.

[25] Ibid., p. 213.

[26] Ibid., pp. 219-23.

[27] Ibid., p. 223.

the margin to place a ceiling on the long-run prices of manganese, nickel, and cobalt. In the second section, it was concluded that deep sea mining will be a highly capital intensive venture, that large capacity and high rates of production will be the rule, and that only a relatively few firms and nations will be able to participate directly in it. It was also concluded that competition for the best deposits of manganese nodules is almost certain to develop once deep sea mining proves feasible so that the rights to mine these deposits will acquire value.

The final section of the paper began with the premise that any institutional regime would have to take account of these economic characteristics. Hence, it focused on the ways in which institutional forces could be designed so as to promote economic efficiency in deep sea mining. The usefulness of a market to establish the value of exclusive mining rights was emphasized as a technique that could go far towards this goal. Among other things, it was suggested that such a market might best be organized around a lease system with closed bids offered in terms of royalty payment.

However, except perhaps for some form of exclusive rights during mining, none of the forces discussed in the third section is absolute in the sense that it must be present for mining to take place. On the one hand, leases could be given away at no charge; pollution could be ignored; performance requirements need not be enforced. A nation might decide, for example, that national security requires better knowledge of the oceans and that subsidizing deep sea mining is one way to obtain it. The point is not that such a decision would be invalid, only that economic efficiency would thereby be reduced below what it otherwise could be. On the other hand, my suggestions have been made on the basis of certain assumptions and projections. If these turn out to be wrong, the suggestions may be inappropriate. Even if they turn out to be correct, alternative institutional forces might be designed that would be preferable in terms of economic efficiency. Additional suggestions are all to the good; each of these matters requires further attention. The purpose of this paper is not to establish definitive criteria, but rather to extend discussion.

DISCUSSION

1. One question of deep sea mining involves the economics of use conflict, that is, in the event of conflict, say between mining and fishing interests, ought one group to pay to the other compensation for not engaging in its planned activities? Threat alone may be sufficient to exact payment.

2. Internationalization of the minerals of the deep ocean floor differs in several respects from that of high seas fisheries; the mining of manganese nodules will probably for some time to come be carried out through highly efficient operations conducted by very large and technically-advanced companies. Under an international scheme these countries would be able to pay the highest bid for mining rights. Why then would a coastal state that has manganese deposits beyond its shelf limits agree to an internationalization scheme? The point is, if mining is to take place, that some organization must have jurisdiction over the resources involved.

TRENDS IN THE MARINE SCIENCES

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The curve of oceanographic history is quite exponential. It sometimes seems to us as if the milestones crowd ever closer together. Depending on how far back one wants to start his history, a hundred or one hundred and fifty years perhaps, he can examine approximately a century of mapping and charting, spotted perhaps by some pockets of quite excellent biological research. This blended into two decades of oceanographic surveys following World War II, along with intensified oceanographic research, mostly ASW-motivated. The past few years have witnessed a rapid succession of "in-words": "applied research," emphasizing resources development, and "ocean engineering." Most recently the social sciences have been highlighted, introducing perplexing legal and economic questions.

We believe the major trends in the progress of the marine science and technology program occur in the broad categories of instrumentation, communications, vehicles, business, and institutional affairs.

(1) Instrumentation

With respect to instrumentation, the Navy's Deep Ocean Technology Program, conceived as a broad-based technological assault on the undersea, will advance the development of technology leading toward the occupation and exploitation of the ocean. Problems to be studied in the immediate future according to the Navy include:

1. The development of fuel cell power plants as prime movers for deep diving submarines.
2. The development of reliable, submersible motors, since motors presently in use are all either incapsulated or unreliable.
3. The advanced development of tandem propulsion plants to enhance the maneuverability so vital to deep submersibles in near-bottom operation.
4. The development of seawater hydraulic systems to provide for improved reliability of deep ocean machinery and vehicles.

Attendant upon research and development in oceanographic instrumentation has been the growing recognition of problems connected with standardization and intercalibration of oceanographic instruments. This is currently considered a major responsibility of the Navy's Oceanographic Instrumentation Center, which spends approximately $2 million a year to support this objective. This includes procurement, maintenance, and operation of specialized test facilities located at the center which can calibrate and test oceanographic instruments of wide varieties and diverse uses.

To editorialize for a moment, we believe the factor of standardization cuts across all the categories that are going to be mentioned in this paper. In the future, designers, developers, and manufacturers will have to attain a modicum of uniformity; the same will apply to researchers and their methods and deep research vehicles and their users. In the latter case, standardization of markings, hatches, fittings, and escape provisions can save lives and add much needed efficiency to present rescue procedures.

In the institutional sense, not only uniformity but--in some instances--clarity is sorely needed in legal regimes which are separate and apart from some of the more glamorous issues being discussed here. Fishing is an example, and a bad one at that. Vagaries in the law, in methods, vessels, equipment and even catch landing confound the skipper, the executive and the conservation scientist from state to state and season to season. We will mention later business prognosticators which have earmarked the fishing industry and its marketing techniques as fertile areas for capital investment. This (speculation) would have better odds at becoming prophetic if more than lip service were given to concepts of standardization--institutional as well as operative.

Increased life expectancy and reliability of undersea electronic instrumentation is coming to the fore and examplified in an underwater transponder developed by Bendix Corporation, which has been functioning satisfactorily in 6,000 feet of water since April, 1963.

A most striking advance in oceanographic instrumentation techniques concerns the advent of computer technology. Computers are used in the following ways in oceanography to:

a. Provide translated (that is, into conventional units) direct read-out from overside measurements.
b. Carry out dynamic computations.
c. Interpolate for readings at standard depths.
d. Store and process data for instant retrieval.
e. Perform statistical computations upon data in terms of time, season, depth, and geographical location.

Several major oceanographic organizations now possess their own computer facilities; most of those not possessing their own computers have direct access through university facilities.

During the past five years the prospect of use of oceanographic buoys, that is, unmanned stations for ocean measurement, has bettered considerably. A survey conducted last year by the Interagency Committee on Oceanography revealed over eighty buoy systems in various phases of design, construction, and/or operation. Accordingly, the Coast Guard, acting as management agent for this committee, is currently sponsoring a study conducted by the Travelers Research Center and Alpine Geophysical Corporation, the purpose of which is to develop optimal programs, including consolidation, elimination, and coordination of several buoy projects now underway. A second aim of this study is to enhance buoy technology itself in order to achieve the best possible system for all of the missions involved and contemplated.

Oceanographic measurement technology (metrology) progressed from mechanics to electronics during the first half of this decade. Developments highlighted remote sensing and read-out; and gains in accuracy, speed, and range of measurements.

But this technology has always been plagued by the problem of adapting terrestrial instrumentation to a cold, wet, corrosive environment under extraordinary pressures. The problem became accentuated with the advent of the scuba diver who particularly needs hand tools to do his work effectively. Unconventional application and modification of several ordinary work tools and techniques, and development of special gear have provided underwater diving research with a new set of unique tools and mechanical aids designed to perform difficult tasks. As described by the Navy Mine Defense Laboratory these new reliable, rugged, and easy to use tools packages will enable commercial divers to facilitate instrument installation and location, data acquisition and recording, and survey and mapping.

In extrapolating trends in instrumentation for the future, those most often predicted appear to include:(1) instruments that can operate in the sea several months without attention,(2) the use of space technology by-products (e.g., microelectronics, etc.); (3) instrument packages,such as (with respect to fisheries for instance), a combination meter, depth sensor, and sampling device for plankton; and (4) expendable instruments which can be used overside, underway, and as demonstrated in the Ship of Opportunity program.

Regardless of the promising trend in instrumentation, certain drawbacks other than those environmental in nature must be recognized. As promising as the instrument market appears, for instance, it will remain relatively small and expand slowly. Thus will emerge a paradoxical situation--if it is not here already--of demand for high quality coupled with an insignificant demand for quantity. This paradox can be expected to keep the cost high.

Although there are minor disagreements among members of the marine science community respecting specific trends in their component technologies, the opinion is unanimous that the trend is generally upward and that the end is not yet in sight. Vast networks of ships, buoys, and satellites are in various stages of concept, design, and fabrication. As a spin-off, communications technology and management have become a major consideration in this nation's ocean-related programs.

(2) Communications

The development of communications should not be taken too lightly when computing the impact of future trends in marine technology. In fact, adequate communications--or the lack of same--may prove to be the operative factor upon which government and industry predicate their decision to develop sophisticated instruments and buoy systems to streamline traditional research methods. Just as good research is the basis of successful application; timely transmission and analysis of scientific data are the foundation of productive research.

The radio-frequency spectrum is a finite resource, the allocation and revision of which are the subjects of international treaty law. Those services already holding a vested interest in portions of this resource must be made to see the multiple advantages derived from the inherent importance of these researches to mankind generally as preliminary steps to mitigate the ravages of ignorance, famine, and the forces of nature gone wild.

These points have been advanced before in the appropriate international forums, but at times when even the environmental scientists were not fully aware of their total significance or their prospectus of benefits. Accordingly, the case has not been won, and even though the environmental scientists cannot fully compute all the likely benefits, they are more knowledgeable than before, and the better for their "combat experience." Of more importance, they have finally developed a united front.

We feel the prognosis for realization in the future is bright; and aided by the support of foreign administrations and international organizations--for which the United States has launched a vigorous campaign--wewould venture to say that the goal so long sought might even be attained in Geneva this fall.

(3) Vehicles

During the past year or two we have seen a revolution in use of the small, deep-running research submarines by all agencies of the federal government, by industry, and universities. ALUMINAUT, ALVIN, DEEP STAR, and other American submersibles that made about thirty research dives in 1965 completed over 200 in 1966. This is clearly a fast-rising trend.

Stemming in part from the unfortunate and tragic losses of the THRESHER and the hydrogen bomb off Spain, the Navy has taken steps to improve and extend its recovery capabilities. Plans include development of small, manned submersibles and associated equipment operational at depths down to 20,000 feet. The first vehicle to be acquired through this substantial engineering task should be ready for test by mid-1971. Effective means for rescuing crews from sunken submarines is also under development. A 30-ton, 50-foot prototype rescue vehicle, air-transportable, and capable of removing two dozen people per trip, is being built.

The deep research vehicle NR-1 is being constructed at Groton, Connecticut, and expected to be launched in 1968. It will be the first true research submersible. With its nuclear propulsion it will be able to remain submerged for several weeks independent of surface conditions. Its ability to operate will be limited only by the endurance of its consumables. In April, 1965, when President Johnson announced that the Navy and the AEC were jointly developing a nuclear-powered, deep submergence, research and engineering vehicle, the NR-1, he noted that vehicles developed to date had been limited by short endurance of propulsion and auxiliary power. This will, therefore, be a truly revolutionary vehicle able to operate at depths considerably deeper than the continental shelf.

Two projects of the SEALAB Program have already been carried out. A third in the advanced planning phase now exemplifies the modern concept of undersea habitation and operation. The discovery and practical application of saturation diving capability can legitimately be considered a breakthrough in underseas technology. This capability will exist at depths greater than 600 feet and might possibly be at least as great as 1,000 feet. For instance, Westinghouse is completing a saturation diving system designed for operations below the 800 foot level. The extension of the continental shelf is a possible result of this deeper diving ability. Its use enables a new look at such missions as installation, inspection, and repair of well-heads for the extraction of oil, gas, and sulfur; the inspection, installation, and repair of bottom installations for communication, navigation, and geodesy; the installation, inspection, and construction of platforms which extend above the free surface; and establishment of fish farms.

Since they are somewhat twinned in concept, it was inevitable that space technology and oceanology would eventually meet. For the past year, the National Aeronautics and Space Administration has been sponsoring a study conducted by the Naval Oceanographic Office on Oceanography from Space. This study deals with various techniques which may be developed to enable oceanographic measurements to be taken directly from satellites. Recently, the American Society for Oceanography teamed up with the Gulf Universities Research Corporation to sponsor a symposium on the Ocean from Space. Some of the better papers included coverage of subjects such as electronic devices to monitor the oceans, measurement of the color of the sea from space, detection of ocean pollutants and food from space, the use of infrared to measure heat flow from the sea, sensing ocean currents from space, and how space research can help develop fisheries.

The trend in mining the oceans has been one of the most interesting trends in ocean technologies because of its diversity. For several years only the petroleum drillers and magnesium and bromine extractors made money from mining the oceans. Then combinations of mineralogy, ocean technology, and economics yielded one after another, several other minerals, such as phosphorites, tin, diamonds. Lately, the Bureau of Mines and Geological Survey agreed to a plan wherein two ships will spend the next summer determining whether economical amounts of tin, gold, silver, and mercury may be found in placer deposits off Alaska, Oregon, and California.

A similar investigation will take place on the continental shelf off the East Coast when Duke University carries out a study in collaboration with the Department of Interior and the Geological Survey. The team will utilize Duke University's vessel EASTWARD to collect bottom samples across the continental shelf to a point about 150 miles offshore at depths up to 15,000 feet. The oil companies themselves are pushing technology to drill ever deeper. Transworld Drilling Company's rig #59, built by Bethlehem Steel, is just being commissioned. This rig has a capability of drilling to 20,000 feet in a water depth of 125 feet.

(4) Business

In respect to business, in general the trend would appear to be favorable for continued industrial expansion. It seems at the moment as if major corporations are likely to dominate the operations for recovering the sea's resources, while smaller firms will tend to supply the supporting services and products. Thus far the criterion for success appears to consist of a nucleus of highly-trained engineers and scientists coupled with a competent, if small staff, on oceanography itself.

As part of the trend to more and more business interest in the ocean, it is only natural that more and more market analyses and business predictions would be conducted for the ocean technologies. It now appears that the banking and investment houses themselves are growing interested to the point of seeking possible targets for capital investment. At the most recent of these conferences--the Hayden, Stone forum on oceanography last May--the Arthur D. Little Management Firm, which had conducted one of the more recent market analyses, outlined their views concerning the best mid-term investment in the ocean:

a. Marine transportation logistics with containerization.
b. Ocean mining at depths of 200 feet or less.
c. Tools and technologies for mining at these depths.
d. The fishing industry, particularly "if a company buys new market techniques."

Viewed from at least one vantage point, trends and problems in the broad categories of business and institution affairs seem to merge. Judgment decisions as to the "risk of the venture" are unavoidable confrontations in the life of any manager/administrator. Their coefficient of importance can approach a state of alarm when the third dimension of "sea space" is added to this decision equation. But usually these uncertainties are confined to operational or engineering problems which, although variable in themselves, may be a constant in computing the advisability of a "sea venture."

The other variables in the decision equation, however, are the likely dilemmas attendant upon business ventures projected abroad. They likewise are all too familiar to the foreign business manager and they are likely to increase as "technology poor," but "resource wealthy" governments seek to import technology to bolster sagging gross national products at home. They are broadly characterized as problems deriving from the acquisition and use of property within a foreign country, licensing arrangements, conflicting foreign tax and monetary regulations and, stated generally, engaging in economic activity in a foreign jurisdiction. To be sure, these problems are not new; they are intimately associated with any foreign business transaction ashore. But here perhaps is the difference and the point. The arena is entirely new, and one urgently calling for development.

These twin factors--namely, the newness of the arena and the need for development--may provide business with the necessary leverage it needs to secure binding and workable guarantees against nationalization, and expropriation of capital assets. (This may sound overly optimistic at the present time.) If capital integrity--at least in the institutional sense--can reasonably be guaranteed, business will be much quicker to assume the "risk of the venture," and foreign peoples and their economies may reap meaningful benefits in a proportionate time.

(5) Social

We view the sociological trends in oceanography as at least as significant as the technological. New major legislation has established a National Council on Marine Resources and Engineering Development headed by the Vice President of the United States and composed of cabinet members and agency heads with major statutory interests in the oceans. Dr. Wenk, the Executive Secretary of this group, covered the details of the operation in his opening remarks to this conference.

To emphasize the role of oceanography in the Navy and in recognition of the oceans as the Navy's operating medium and of its concomitant critical importance to Navy operations, the Secretary of the Navy has established a new office of the Oceanographer of the Navy and invested it with the necessary authority to provide centralized direction of all of the Navy's oceanographic activities. Of course, you are all aware of the recent reorganization of the Department of Commerce, linking the Coast and Geodetic Survey with the Weather Bureau to become the Environmental Science Services Administration and, more recently, the very dramatic reorganization combining in committee form all of the agencies (about nine I believe) in the Department of the Interior and coordinated by the Assistant Secretary of the Interior and managed by the Director of Mines, Dr. Hibbard.

Through the leadership provided by the new Council the government has elected to spend approximately $41 million during fiscal year 1968 on several oceanographic program areas selected for priority emphasis, including:

a. Food from the sea programs designed to accelerate development of fish protein concentrate.
b. Offshore mineral exploration.
c. Expanded ocean weather observation systems.
d. Recovery of lost equipment.
e. A new research vessel for subpolar water exploration.
f. Peaceful use of the oceans through international cooperation.
g. Implementation of the National Sea Grant Program to increase education, research, and information transfer.

You will, of course, pardon the one minute for the commercial. The last item recognizes a problem in sponsorship philosophy. The federal government has been most generous in support of basic oceanographic research for several years. However, when the research has an end--when the mission is clearly identified--for the most part such research is carried out within several federal laboratories (between fifty and seventy-five). Now, through Public Law 89-688 (the Sea Grant Colleges and Program Act passed last year), the government, specifically the National Science Foundation, is permitted to sponsor applied research programs, education emphasizing the engineer and technician classifications, and information transfer projects such as workshop courses, demonstration programs, and extension services of all kinds. The complete announcement of this program came out about two weeks ago; you will find several copies on the table in the lobby.

An unfortunate but predictable result of the growing national interest in oceanography concerns the burgeoning societies and various organizations of individuals interested in one way or another in the oceans. Stemming from this interest, two types of societies have arisen: those formed directly and entirely concerned with the oceans; and those which are simply branches or divisions established by a major organization of another kind, such as the various engineering societies.

The advantages accruing from this proliferation, including, importantly, an acceleration of the rate at which Father Neptune's gospel is being spread, are felt to be overbalanced by their failings. First, a lack of consolidation dilutes the image of the overall effort in the public view; second, the inevitable competition for membership among all of these groups prevents any of them from reaching sufficient size for maximum effectiveness. At a time when students are graduating in oceanography in increasing numbers, they are confronted by a bewildering kaleidoscope of organizations. Most of the members of the oceanographic community hold membership in five to ten organizations, with resultant drain on the pocketbook, and confrontation by a flow of publications which cannot possibly be assimilated.

Public awareness has stimulated local government action. Nearly all of the coastal states now have some form or another of state-backed organizations for oceanography and the marine sciences.

With the growth of the oceanographic program itself, it was inevitable that the pressure of increasing competition would squeeze to the top certain centers in both the industrial and university worlds where the combination of talent, sound promotion, top level interest, and various geographic factors would combine to push the marine science and technology program at a faster pace. Now are emerging regional centers, each a major complex, and each supported by what might be termed a major maritime university or a consortium of universities. Such centers are beginning to evolve at several points along our coastlines. They are normally composed around a nucleus of a major university and include federal and state research and development facilities. In some cases they include marine industrial parks, common information and educational enterprises such as libraries, computing centers, oceanariums, marine museums, conference and seminar centers, and common laboratory and workshop facilities. Such centers usually feature excellent harbor facilities.

Conclusion

If they show nothing else at least these trends indicate clearly that man is accepting the challenge of the ocean. This challenge may be generally stated in the following manner--success will require three things:

1. A technology capable of providing vehicles, tools, techniques, and means of navigation and communication suitable for work and travel on and under the sea.

2. An incentive to make men want to go there if given the chance. This is, of course, what we are all trying to do and incentive is no one's if not the American's birthright.

3. At the local, state, and national level, the vision and will to organize, to fund, and to manage an enterprise of this magnitude and importance.

This, then, has been our version of the trends and challenge of inner space. The assessment of the degree to which this challenge is accepted must await the cold light of history.

SECURITY INTERESTS AND REGIMES OF THE SEA

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When our astronauts ventured into space, they turned their cameras back toward the earth so that we could view the surface of this globe from a truly objective point of view. In viewing some of these remarkable photographs, one rather skeptical youngster is reported to have said, "These can't be real because the countries are not in different colors, in fact you can't even tell where the boundaries are." In any discussion of regimes of the sea it seems to me that, if we are going to approach the subject objectively, we must recognize several fundamental characteristics of the sea. One of these facts is that none of these "regimes" is going to be discernible in high altitude color photographs of the water.

We must recognize that we shall be discussing legal and political concepts, that is relations between people, or groups of people, rather than any inherent characteristic of the sea itself. Of course, we are concerned about geography, oceanography, and even the scientific developments which give us greater access to the resources and other benefits to be gained from the sea. But our fundamental objective in creating or perpetuating any regime of the high seas is to deal with problems involving the relations of men, groups of men, nations or groups of nations, concerning the respective uses of the sea.

While we are dealing with fundamentals, it seems appropriate to recite certain other basic facts and assumptions which bear heavily on subsequent discussions. At the present time the United States has developed the most productive economic and industrial complex this world has ever known. This complex, our welfare, our way of life, and perhaps our very existence as a nation, is dependent on the annual $32 billion worth of exports and imports carried in waterborne commerce. All of us are aware of the government's endeavors at stockpiling certain essential raw materials as a national defense measure. Many of us can remember when "Lucky Strike Green" went to war because of the copper shortages in World War II. At one point we were using silver from the United States mint to replace the wiring in certain electrical circuits. But that was way back in World War II. Let me give just a couple of illustrations which are current. At the present time almost half of the free-world's mineral production is channeled to the needs of our industrial complex. In certain critical items such as tin, manganese and chromite we consume in excess of one-fifth of the world's total production and yet our domestic production of these minerals is either nonexistent or less than one per cent of our requirements. I will not dwell on what would happen to our economy without tin cans--or even tin foil. I merely want to be sure that we fully appreciate how important these materials are and secondarily how important it is that we retain the navigational freedoms necessary to permit us to import them.

Many people have become so enthralled with the air or jet age they want to downgrade the necessity factor. They say that, in an emergency, we can bring in what we absolutely have to have by air transport. The most effective rebuttal to this fallacious philosophy (at least the most effective rebuttal that I have seen) took place in a presentation given by a visiting Admiral to Class 38 at the Armed Forces Staff College. The Admiral brought a chart with him, as many of the guest speakers do, and he placed this chart to his right and behind him during the lecture. On the chart was a comparison of air and sea lift marked in broad red stripes. The air lift line was about six inches long and the sea lift was about three times that. At the conclusion of his lecture he explained that the chart was not accurate as it stood and asked for several assistants from the audience. He further explained that he had attached a roll of red ribbon to the chart to show the sea lift line in its proper proportion. At this point he had one of the officers pull the ribbon out and gradually drew it all the way across the stage. Then, with another officer's assistance in holding the corner, the ribbon bearer went off the stage, down the aisle to the back of the auditorium, then across the back of the auditorium, then down the other aisle to the front and then across the front to where he had already passed. In order to show a comparison with that six inches of air lift he had to use about 500 feet of ribbon. For those who are statistically minded, figures show that air lift of all commerce (export and import) has never exceeded one-tenth of one per cent. The object here is, not to downgrade the importance of air transport, which is indeed vital to all branches of the military service, but to put the importance of sea lift in its proper perspective.

My next basic assumption is that the United States will continue to maintain the most powerful naval force in the world. This is considered to be essential just as a matter of self-preservation. At the present time our deterrent capability rests in large part on our nuclear equipped missiles carried on board nuclear powered submarines. In addition we practically monopolize the world's carrier attack forces. We lead by far in our amphibious assault forces, and thus far our logistic capability in backing up and supporting these forces has been successful beyond belief. But all of this is dependent on having waters in which we can freely sail. In order to perform properly the missions assigned, whether they be a quarantine of Cuba, a landing in Lebanon, support of operations in Viet Nam, or evacuation of American citizens in the Middle East, our ships must be permitted to navigate international waters as well as those straits and canals which lead from one high seas area to another.

My last basic premise is prompted by the first sentence of Dr. Edward Teller in an article published in the Summer, 1966, edition of Orbis. Dr. Teller states that, "Nuclear explosives and inter-continental missiles have deprived the United States of the protection of its ocean barriers." (Underscoring added.) It is my view that, in the life time of our country, the oceans have not been, and are not now, either "barriers" or "doorways." Our discussions can be much more profitable if we disabuse ourselves of these classic approaches and consider the seas for what they really are. I prefer the term "medium" which my dictionary defines as, "an intervening thing through which a force acts or an effect is produced." In our situation we find that this "medium" covers 70.8 per cent or 140 million square miles of our globe and has depths of greater magnitude than the heights of our highest mountains. Our approach to the seas can be in a vein of acceptance, use, and exploitation as its nature will permit. Or we can look upon the seas as an alien hostile environment to air-breathing man and a mysterious, tempermental threat to many of the things we cherish. I much prefer the approach of the master swimmer or the proficient scuba diver who feels at home rather than the approach of the frantic,

fearful novice who flails the water and strangles as he tries to swim. Perhaps this analogy is an over-simplification. But an appreciation of this philosophical approach is, in my view, essential to an understanding of the problems with which we are confronted.

Perhaps the most serious problem with which we are confronted is the question of territorial waters. What do we mean by the term and how far from the coast should such waters extend? When I first started working with the subject of territorial waters I had a fairly clear understanding of the term. It meant that part of the seas contiguous to the coast of a state over which sovereignty could be exercised in the same manner as in the adjacent land area. In fact, Article 1 of the Territorial Seas Convention of 1958 embodies this same view. But it goes on to say, in paragraph 2, that this sovereignty is to be exercised "subject to the provisions of these articles and to other rules of international law." Obviously this includes the right of innocent passage which is defined within the Convention. Passage is considered to be innocent so long as it is not prejedicial to the peace, good order or security of the state. Passage is also defined to include:

> " (a) Navigation through the territorial sea for the purpose either of traversing that sea without entering internal waters, or of proceeding to internal waters, or of making for the high seas from internal waters.
>
> " (b) Stopping and anchoring, but only in so far as incidental to ordinary navigation or rendered necessary by force majeure or by distress."

As I learned more and more about the subject, I became less certain of my definitions. The subject became a little more complicated when I first discovered the "contiguous zones"--areas in which a coastal state may exercise the control necessary to:

> " (a) Prevent infringement of its customs, fiscal, immigration, or sanitary regulations within its territory or its territorial sea;
>
> " (b) Punish infringement of the above regulations committed within its territory or territorial sea."[1]

Much to my surprise I found that the United States has claimed jurisdiction to twelve miles from its coast for customs purposes since 1790. Moreover, we have had legislation in effect for this purpose ever since that time.[2] My grasp of the problem was not helped by the fact that a number of countries, such as, El Salvador, Peru, and Ecuador, claimed sovereignty to 200 miles when it seemed to be relatively clear that they initially wanted some means by which they could unilaterally control fishing rights. As there is currently no right of innocent passage for aircraft over the territorial sea, Chile suddenly found that the 200 mile territorial waters claim of Peru threatened to cut off her freedom to fly over international waters within the areas claimed by Peru. A formal protest resulted. When Argentina decided that she too should make the 200 mile claim, she claimed sovereignty but specifically stated that this law does not affect freedom of navigation and overflight in the area. It is obvious that Argentina's prime desire is to control fishing rights. But, in Argentine eyes, would other things, such as oceanographic operations or naval exercises, contravene their newly promulgated law?

Before proceeding further let us see what the official United States position is with respect to the territorial sea. In 1793 Thomas Jefferson, as Secretary of State, announced that the United States adhered to the three mile limit. Since that time this limit has been considered an integral part of our overall policy on freedom of the seas. Prior to the 1958 Law of the Sea Conference the Judge Advocate General of the Navy, then Rear Admiral Ward, had occasion to address a rather substantial number of law specialists at a regional meeting of the American Bar Association in Atlanta, Georgia. I was deeply impressed with the vigor and confidence with which he assured us that the coming international conference was going to be a success. He informed us that the United States delegation knew that we wanted international agreement to the three-mile limit and that we would do what was necessary to get it. Unfortunately, his optimistic outlook was doomed to a rather sad demise. Even an offer of a six-mile territorial sea coupled with an additional six-mile fishing zone failed by one vote in obtaining the necessary two-thirds vote of the delegates. On April 28, 1958, after this proposal was defeated, the chairman of the United States delegation, Mr. Arthur Dean, made clear the American position:

> "...the three-mile rule is and will continue to be established international law, to which we adhere....In our view there is no obligation on the part of states adhering to the three-mile rule to recognize claims on the part of other states to a greater breadth of territorial sea."

The second conference on the Law of the Sea held in Geneva in 1960 also failed to reach agreement on the breadth of the territorial sea. Moreover, this position has been substantially incorporated in an official protest in every case where a nation has unilaterally extended its territorial seas since 1958--at least in every case of which I am aware.

As part of my current assignment I try to maintain a current record of the claims of all countries concerning the width of their territorial seas. This has not been easy. There are just over one hundred states that have coastlines. Many of these are among the sixty states that have achieved independence since 1943. Common to most of these new nations is the fresh consciousness of national domain and sovereignty which has led to claims of high seas areas as territorial waters. In the absence of international agreement on the breadth of the territorial sea and, in the absence of any effective international denunciation and limitation of such claims, the pressures of domestic politics have resulted

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[1] Article 24 of the Territorial Sea Convention.

[2] Section 21 of American Law Institute's Restatement, Foreign Relations Law of the United States.

in a flood of exaggerated claims. My latest count shows over sixty nations claiming territorial seas in excess of three miles while only thirty-three still adhere to the traditional three mile limit. A number have adopted, on a unilateral basis, the six-plus-six concept that almost achieved international acceptance at the Law of the Sea Conferences. Most of the others have emulated the Soviet and Chinese Communist positions in claiming a straight twelve mile limit. My latest count on this group is thirty-four. Even more disturbing is the relatively successful enforcement of the 200 mile claims by a few Central and South American countries. I say "relatively successful" on the ground that these countries have fined our fishing boats, and have refused international, political, or juridical resolution of the disputed claims. Moreover, our diplomatic endeavors thus far have not been crowned with a great deal of success.

What is the answer to this unmistakable trend? At least one constructive approach has been suggested in an excellent and provocative article by Captain Geoffrey E. Carlisle in the February, 1967, issue of the Naval Institute Proceedings. While I cannot agree with all that is contained in this article, I do concur in the principal conclusion which states that our greatest danger is not in the extensions of the territorial seas per se but the threat of closure to international straits. I also concur with his thesis that we should seek the right of aircraft to freely fly over such straits.

Are these proposals without precedent? Idealistic? Unreasonable? I would submit that they are not. If it can be shown that the creation of such navigation and overflight privileges are also in the best interests of the coastal state, the biggest obstacle would seem to have been overcome. A beginning toward this kind of thinking exists in the Montreux Convention of July 29, 1936. This convention guarantees the freedom of navigation, subject to certain limitations, through the Turkish Straits which connect the Mediterranean and the Black Sea. Although the United States is not a party to this treaty, our policy has been to respect its provisions, though the limitations on the passage of warships prevents us from sending our submarines or capital ships into the Black Sea. The actual signatories were the four Black Sea Powers (Turkey, Bulgaria, Rumania, and the Soviet Union) and five other maritime states (France, Great Britain, Greece, Japan, and Yugoslavia). Although military aircraft are not mentioned, the passage of civil aircraft between the two seas is guaranteed in Article 23. The government of Turkey may create forbidden zones in the strait so long as she makes available an alternate air route. In return Turkey must be given no less than three days prior notification for flights other than those regularly scheduled and by merely giving a general notification with respect to the latter. While Turkey has demonstrated a great deal of sensitivity with respect to her sovereignty I am unaware of any current feeling of inferiority because of this infringement on Turkish sovereignty. It is my understanding that Turkey is relatively content with the Montreux Convention and that all threats of cancellation have come from the Soviet Union.

In case number two, the government of Sweden in the summer of 1966, by unilateral action, recognized the advantages to herself in creating free passages for both ships and aircraft through the strait connecting Kattegat with the Baltic Sea. The Swedish Code of Statutes No. 366 contains many provisions which could be emulated by many countries with benefit to themselves as well as to the international community. Article 5 provides that military aircraft are permitted to enter air space over territorial waters for the purpose of passing through it in the Presund Sound between the lines Kullen-Gilbjergnoved and Falsterboudde-Stevnsflyr. This decree is also unique in that it authorized the entry of distressed aircraft in much the same manner as international law provides for distressed ships. (Strangely enough, the international community has been very tardy in providing international protection for distressed aircraft.) Sweden apparently recognizes that, by exercising her sovereign prerogatives in this manner, she has gained the advantage of avoiding many irritating, costly, and unnecessary international controversies.

While this is neither the time nor the place to engage in a full blown discussion of the Gulf of Aqaba and the Strait of Tiran, I cannot help but wonder what would have been the situation had the United Arab Republic followed the example of Sweden rather than declaring a blockade. I am also wondering if the ultimate settlement will be far-sighted enough to provide for freedom of air navigation through the Gulf of Aqaba and the Strait of Tiran. Even Israel did not claim such a legal right before the recent war. But would not a concession of this kind to future air travel be a step toward a lasting peace, an aid to the commercial ties which assist in the economic growth so vital to all of the Middle Eastern countries?

But what about other future naval requirements? We will, of course, need to have operating areas where we can exercise with weapons. We will need air space reservations in which to train with high performance aircraft. These problems will have to be worked out in each individual case trying to equitably balance the economic needs of our country against the military requirements. Clashes are bound to occur because there will not be enough to satisfy the demands of all.

The next point that I want to cover is one which emerges from time to time, almost on a regular basis. This is the concept of Maritime Security Zones on the high seas. The question is often asked as to why we do not establish such zones 100 or 200 miles off our coast with a view toward controlling the approach of hostile or potentially hostile surface ships or submarines of other nations. The zones would be called SEADIZ or SUBDIZ areas depending on what is controlled and would operate in much the same manner as the existing air defense identification zones (ADIZ). As most people are aware, these zones were established by the United States at a time when there was great apprehension about the possibility of a sudden massive air attack with nuclear bombs. The system required that all aircraft intending to enter United States airspace from foreign or international airspace identify themselves a hundred miles or so from United States airspace. Usually a sealed code word was given to the aircraft commander at his last stop before entering the United States. By using the code word in response to a radio challenge, the Continental Air Defense Command could be informed concerning aircraft which might pose a threat to our security. If an aircraft bound for United States airspace showed up on a radar scope without properly identifying itself, fighter aircraft were scrambled. Within minutes the offending aircraft would have company. To my knowledge, the fighters never shot down an aircraft but they were fully prepared to do so.

The legal question raised by this was whether or not the ADIZ system was in fact a unilateral extension of United States sovereignty over many miles of international airspace and consequently a claim to subjacent high seas areas. I have heard rather responsible people readily agree that it was an extension of sovereignty but that it was justified on

the grounds of self-defense. In my view this is erroneous--not that I am opposed to the concept of self-defense but because there is no need to attempt to justify the ADIZ in international law solely on the grounds of self-defense.

In the first place, a hostile aircraft (assuming that there is no doubt that it is hostile) may be destroyed in international airspace 1,000 miles from one's shores with just as much legal sanction as it can after it penetrates the ADIZ or even after it penetrates United States airspace. Of course, the fact that the unidentified plane has entered the ADIZ or entered United States airspace may be one of the factors to be considered in deciding whether or not to declare the aircraft hostile. But the main point is that destruction is authorized only after it has been concluded that the aircraft is in fact hostile. Mere penetration of the ADIZ or even the illegal entry into United States airspace is not, in the absence of other factors, sufficient to warrant destruction of the intruder under United States concepts of international law.

A careful examination of the ADIZ regulations will disclose that they apply only to those aircraft over whom the United States has jurisdiction because of ownership or registration plus those aircraft which ultimately intend to enter American airspace. As a sovereign we have the power to place any reasonable, and perhaps even unreasonable, conditions on the granting of permission to enter United States airspace. Of course, restrictions must be in conformity with Chicago Convention and International Air Transit Services Agreement as well as bilateral agreements to which the United States is a party. What about those foreign aircraft which penetrate the ADIZ in a point to point flight which does not require entry into U.S. airspace? Most countries would rather notify the United States of these flights than have armed aircraft escorting them through the zone. Consequently, they normally file a flight plan which results in notification of the appropriate United States officials. But we do not, and in my view cannot, legally complain about a penetration of the ADIZ unaccompanied by a penetration of United States airspace.

When we look at a proposed SUBDIZ or SEADIZ in light of the foregoing, we find that the situations are not remotely analogous. Many ships routinely ply trade routes off United States coasts without penetrating U.S. territorial waters. To require these ships to report their location would be an attempt to exercise sovereignty over an area of the high seas. Except in certain limited ways we cannot require this, even in territorial waters, without doing violence to freedom of the seas and more particularly to the right of innocent passage.

From a practical point of view we do not have the resources to escort every ship that might fail to give the appropriate notification. Even if we limited the requirement to submarines only, we might have to track some of the nuclear powered ships for days before they surfaced. They would probably take great delight in deliberately causing us to expend our naval resources in such a futile exercise. Moreover, if we desire to shadow a potentially hostile submarine, we should feel free to do so anywhere on the high seas and not merely within the self-imposed limits of a SUBDIZ.

What is most important is that we must be prepared to accept what other countries would do in emulation of the United States. If we set a 100 mile zone, what is to prevent other countries from setting a 200 or a 500 or to the median line of the oceans? What limitations we might desire to apply to submarines, they might desire to apply to all war ships. Or they might desire to apply regulations on the high seas to all nuclear powered ships, or just all United States-United Kingdom ships, or just Israeli ships, and so on. Obviously, a tendency toward such regimes of the high seas would seriously compromise the effective utilization of United States sea power.

For the sake of completeness let me just mention a few of the other legal regimes of the sea which have been used or which are currently being used. Where there is a particularly sensitive area from a defense point of view we have created Sea Defensive Areas. These areas have been declared by Executive Orders of the President under the statutory authority granted him in the U.S. Code.[3] I would like to be able to say that they have always been restricted to United States territorial waters but occasionally, in a wartime situation, some have actually included some small areas of the high seas. This right is fully recognized in Article 16 of the Conventions on the Territorial Sea and the Contiguous Zone. This convention requires that the suspension be for security reasons and that it be applied without discrimination. Regulations for entry into these areas (generally the waters surrounding a naval base or installation) are contained in Navy Instructions.[4]

From 1939 to 1941 we supported what was called a "neutral protective zone." This zone was established by the Declaration of Panama in an attempt to keep the hostile actions of the European belligerents from intruding into the waters adjacent to the American continent. This area extended eastward from the American continents several hundred miles. The possibility of this concept being of much use in the current, or even in the future, political environment of the international community is probably very remote.

We have also had certain "Maritime Security Zones" which have extended beyond territorial waters. The authority cited for the establishment of Maritime Control Areas is normally that resting in the Chief Executive as "President of the United States, Commander-in-Chief of the Army and Navy and in accordance with the principle of self-defense of the law of Nations." In practice these areas have been established only in time of war, although authority to establish them would seem to exist at other times if necessary to meet an immediate threat to the national security. The measures and extent of the control are established by regulation. During World War II the United States established some seventeen maritime control areas by Presidential Proclamation. Vessels were required to navigate the waters of the areas during daylight when good visibility conditions prevailed and under United States authorized supervision. All of the seventeen maritime control areas were discontinued in 1945 and 1946 and there are none in existence at present.

I have deliberately avoided any mention of the Cuban Quarantine, the United Nations sponsored British blockade of oil to Rhodesia, and other similar actions because they do not actually involve regimes of the sea. As I noted at

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[3] 18 USC 2152.

[4] OPNAV Instructions 5500.49 and 5500.11.

the outset, regimes are created to regulate the problems involved in the relations of men, groups of men, nations, or groups of nations. Whatever the future may hold, the exercise of considered judgment will be essential to the resolution of the problems involved in the creation or perpetuation of special regimes of the sea. Without naval power, which is permitted to fully enjoy freedom of the seas, our security will be in jeopardy. It would be foolish, indeed, to believe that our economic system could survive in the modern world if we were to be denied the use of the seas.

In conclusion, I would submit that, just as our security is dependent on a strong Navy, our Navy is dependent on a strong United States economy. Careful consideration must be given to the delicate balance between the demands of our economic community and the requirements essential to the Navy. There will be conflicting demands which must be resolved objectively. The ultimate decisions must be based on what is best for the overall national interest.

OFFSHORE PETROLEUM AND NATURAL GAS: A MARINE RESOURCE OF INCREASING IMPORTANCE

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One of the most indispensable ingredients in our nation's modern industrial society is an assured and dependable supply of energy. It is, in fact, the very life blood of our economic system, and, if the growth of that system is to continue with due regard to anticipated increases in population, we must search for and develop new energy resources with even greater vigor than heretofore.

Today I want to talk about an important segment of this energy supply--oil and gas--with particular emphasis on the development of offshore deposits in the marine environment and some of the problems associated with this significant element of the petroleum industry.

For the past six years, oil and natural gas have contributed between 73 and 74 per cent of the total energy consumed in the United States. In 1980 it is estimated that the domestic consumption of these fuels will be 50 per cent greater than at present. To give you some idea of the magnitude of this demand, let me quote a few statistics. If we are anywhere near right about our estimates of the future, the United States will consume 78 billion barrels of oil and 283 trillion cubic feet of gas over the next fourteen years. This is more petroleum hydrocarbons than we have used in all the 107 years that the oil industry has been in existence. In the light of these circumstances, I am sure you will agree that our need for knowledge, and our requirement for understanding of how best to produce and use our liquid fuel resources will be challenged as never before.

We must look to new areas for potential petroleum development, and, in my opinion, the most significant of these is the continental shelf. It is here that the petroleum industry during the last two decades has successfully combined a specialized knowledge with an imaginative technology to explore and develop new sources of liquid fuels.

Interest in continental shelf petroleum resources began with the realization that productive limits of many coastal onshore oilfields extended beyond the water's edge. The first development of such an extension occurred off the coast of California just before the turn of the century. This and other early extensions were developed by wells drilled from sea wharves, or by wells directionally drilled from land. In 1947, an oilfield was discovered by a well drilled from a platform in the Gulf of Mexico at a site twelve miles from shore in twenty feet of water.

The success of these early efforts provided impetus to marine exploration and now there are approximately 250 oil and gas fields on the continental shelf of the United States. Approximately 90 per cent of these are located in the Gulf of Mexico in water depths to 300 feet. Many are located as far as 100 miles offshore.

More than 3,000 dry holes and approximately 9,000 oil and gas completions have been drilled on the continental shelf of the United States. Today these wells account for approximately 8 per cent of the domestic crude oil output and 7 per cent of the natural gas production. And these offshore areas are showing increasing production potential. Louisiana continental shelf production, for example, has been growing at an annual rate greater than 20 per cent compared to a United States "on-shore" oil production growth rate of less than 5 per cent.

By any standards, the growth in offshore activities is impressive indeed. But it has not been accomplished without difficulty for there are many unusual problems to overcome. Offshore operations are the most costly in the domestic petroleum picture, due not only to the extraordinary hazards and adversities of operating in salt water, but also to the depths of the wells drilled and the valuation that competing bidders placed on federal and state leaseholds they purchased, particularly in the Mississippi Delta region off Louisiana.

Since 1953, nearly $2 billion has been paid for lease bonuses to the federal government alone, plus an unknown amount to state governments. With investments of this magnitude in federal leases subject to forfeit within five years if production is not established, an unusually sizeable drilling effort necessarily follows. In recent years, in fact, between 15 and 20 per cent of the domestic petroleum industry's total expenditures for exploration and development has gone to offshore operations.

The costs are high compared to onshore activity. For example, the average drilling costs of an offshore well to a depth of 10,000 to 12,500 feet is about $350,000, more than twice the cost of a comparable onshore operation. Offshore pipeline costs range from two to four times greater than onshore, and the cost of deck space on steel fixed platforms is larger, especially as the water depth increases. About the only cost that is lower than onshore activity is the expense connected with geophysical activity. This can be expected to rise, however, as exploration and development moves farther offshore.

Current petroleum exploration is limited to the shallower portions of the continental shelf along the East, West, and Gulf coasts. With the continued success of these activities, future domestic marine resource exploitation can be expected to move to the deeper portions of the approximately 875,000 square miles of the continental shelf of the United States including Alaska and may extend to the 300,000 square miles of continental slope extending to depths of 6,500 feet. Industry indicates that within five years drilling for oil and gas will be conducted in 1,000 feet of water, and within ten years full-scale pressure controlled drilling will occur in depths of 3,000 feet. The capability of drilling in 4,800 feet of water by using dynamically stationed or positioned surface floating drilling vessels has already been demonstrated in the Gulf and the Pacific. However, the coreholes that are drilled at such depths penetrate no more than

1,000 feet of sediment, and the required drilling and pressure control systems are not as elaborate as would be required for oil and gas test wells.

Another factor contributing to higher operating costs is the severity of weather conditions in the marine environment. Those of you who may have witnessed firsthand the awful devastation of the hurricane in the Gulf of Mexico can certainly have a feeling for this aspect of operational difficulties. During the last three years in the Gulf the industry sustained well over $57 million in hurricane losses. About half of such losses are attributed to damaged and destroyed mobile units. As a result, Lloyds of London, who insure more than half of the mobile rigs, in 1966 more than doubled the insurance rates for offshore units and increased the rates for other marine equipment. The increase added approximately 16 per cent to mobile rig operating costs. It is estimated that the bill for offshore insurance is $12 million to $15 million annually. Quite understandably the industry is considering alternate methods of insuring against catastrophic losses.

Offshore petroleum interest created the need for a new technology and for equipment capable of survival in the formerly inaccessible marine environment. Initially, exploration wells were drilled from fixed platforms. Now, virtually all exploration and most field extension wells are drilled from mobile drilling units. This advancement in equipment design has occurred within a relatively short time when one considers that in 1949, only one mobile rig, designed for offshore drilling, existed in the world. Today, there are approximately 150 such rigs in operation and another twenty are under construction or are committed for construction. The cost of the units, more than half of which operate in the Gulf of Mexico, ranges from $2 million to $10 million.

To give you some idea of the complexity of these mobile units, let me take a moment at this point to discuss the great variation in their design. Basically, there are three types of mobile drilling units and each configuration attempts to resolve the problems inherent in the dynamic marine environment such as water depths, tidal and littoral currents, floor bottom mechanics, ice flows, hurricanes, and so forth.

One type of mobile rig is supported on the ocean floor. The structural members of such units may be fixed rigidly, or the units may be equipped with jack-up devices and a superstructure capable of floating. This type was first used in inland water operations and is best suited for relatively shallow water. The units using stilt-like spud legs have a water-depth capability to about 240 feet.

Another type is the semi-submersible drilling unit that neither floats as a ship nor rests on the bottom. It is partially submersed by an elaborate automatic anchoring and bouyancy-control system. The system is used to extend the water depth capacity of many of the bottom setting units not equipped with spud legs and takes advantage of the wave transparency characteristic of such mobile units. Semi-submersibles have been used in 600 feet of water and are probably capable of even greater depths.

Still another type is the ship-shaped, self-powered floater. The principle of dynamic positioning keeps this unit over the drill site and permits effective use of such equipment under severe wave and wind conditions. Position control devices have maintained vessels over the drill site in twenty-five-foot seas with buffeting winds up to sixty miles per hour. Larger power units, which control the vessel's surface attitude may be employed to increase operational time in areas of severe currents and winds. Floaters have been used to drill 1,000-foot core holes in water depths to 4,800 feet, as well as numerous oil and gas tests in lesser water depths.

I believe that in the future, semi-submersibles and the self-powered floaters will be committed to ever-increasing water depths. The ultimate design objective for a drilling unit is depicted as a totally automatic, submarine unit, whose principal function will be unaffected by environmental forces.

After a successful well is drilled and completed, the usual well-completion technique requires that the production tree be installed above the surface of the water. The tree may be located on a single or multi-well platform or it may be installed on the caisson, thus exposing such equipment to the elements and to ocean traffic. Efforts to produce and maintain wells through specially designed underwater production trees are in the field-testing phase.

Today there are more than fifty wells throughout the world that produce through production heads located under water; however, most are completed with conventional land equipment and in water less than sixty feet deep. These systems require divers to assist in the installation and repair. It is obvious that as drilling activity moves to greater water depths, well completions must be independent of man's limited capacity to work underseas. Ultimately, underwater production-control equipment must be designed to be remotely installed, operated, and serviced.

Obviously, the technological challenges will not grow less formidable as the industry moves outward into deeper water. But, as I have already indicated, that is clearly the direction in which it is moving. The fact that it is doing so--despite the higher cost of investment and insurance, despite the hazards of a relatively unfamiliar and frequently hostile environment, and despite knowledge that there will certainly be conflicts difficult to resolve--indicates both the force of the incentive and the confidence that has derived from the striking successes to date. This outward movement, insofar as we can judge, shows no signs of slowing down.

The Department of the Interior has a major responsibility to assess carefully these developments in offshore oil and gas production. The department cannot act merely as an onlooker in this bold and challenging enterprise. Past legislation has confirmed the federal government's jurisdiction over the resources of the outer continental shelf, and recent laws have illuminated the department's special responsibilities. I refer particularly to the Marine Resources and Engineering Development Act of 1966.

Under the legislation, promoting wise development and use of marine resources--all of them--has been affirmed as a logical extension, and even an enlargement, of the department's historic mission on land. In the past, as you know, various Interior bureaus and agencies had various responsibilities in the marine field and often each worked alone.

Now we are working ever more closely together, under a Marine Resources Development Program in which I am currently serving as Program Manager. The Bureau of Mines and her sister agencies no longer look individually at separate marine resources; instead, we look together at the total resource potential of the sea.

In this context, our interest in offshore oil and gas production is clear. We see it not merely as a promising way to increase the nation's energy resources, but as part of an integrated system of marine resource development. The drilling platform stands in a sea that is habitat to fish; its drill penetrates geological formations that can reasonably be expected to contain other minerals of commercial value. How could the interrelationships among resources, and the potential for conflicts in their wise development, be plainer? We have learned much from the past, and from the environmental problems that plague us today on the land--air pollution, stream pollution, soil erosion, and others. The Department of the Interior has been told by the Congress, in no uncertain terms, "See to it that history does not repeat itself in the ocean."

Now, our Marine Resources Development Program is only a fledgling, and I am not here today to describe it in detail. We are just getting underway, and the planning stage is not yet complete. But, in the process of making these plans we have been looking intently into the status of marine resource development, especially in areas where several kinds of resources are being exploited in close proximity. I would like to tell you some of the things we have learned from this examination.

It will strike you, as it struck us, that the Gulf of Mexico is a splendid example of an area of multiple marine resource development. I have already described the thriving oil and gas production industry of the Gulf. One company is also recovering sulfur from formations under the floor of the Gulf. Some of the world's tastiest shrimp burrow in the sands of that floor, and every year they emerge by the ton to be trapped in the nets of the shrimp boats. Other boats dredge up huge quantities of oysters and clams; still others trawl their nets through the water to take fish of many species. The sport fisherman also plies these waters; he takes fewer fish but probably has more fun doing it. Huge ships of commerce traverse the area, converging on the Gulf ports and scattering seaward again to keep up the vital flow of international trade. The Gulf is also an area in which our military forces, with their many requirements, are extremely active. Finally, this water, that has passed through so many nets and around so many hooks and hulls, laps up on the shores of five states where it provides a valued recreational resource for millions of people.

This is truly multiple use. Nowhere else in the world, perhaps, is the resource potential of a single body of water being realized so fully. In this respect, the Gulf gives us a foretaste of what may happen in other continental waters of the United States. So it is natural for us in the Department, with our responsibility in marine resource development, to look at this region and ask, "How has it worked out? How compatible have these various uses proven to be?"

The answer, we believe, is that things have worked out very well and that the degree of compatibility is remarkable. The many uses of the Gulf--oil production, fishing, recreation, and the rest--are thriving, and they thrive together. Indeed, it is not unknown for one to confer a positive benefit on the other, such as the improvement in game fishing that has been noted in the vicinity of drilling rigs whose legs provide a favorable environment for fish.

Upon closer examination, we have found that this condition of compatibility is no happy accident. It is, rather, the sum of countless day-to-day interactions and interrelationships. Many good examples of this can be seen in the case of oil and gas operations. For instance, the relationship of drilling rigs to vessels using the Gulf is not left to chance. It is governed by regulations that call for the display of certain types of warning beacons on these rigs, and that designate certain "freeways" through which ships may pass in bad weather with the assurance that they will encounter no rigs at all.

In another direction, care is taken to minimize the danger of oil from drilling or production equipment polluting waters that support fish and provide human recreation. The Department's Geological Survey, in fact, inspects these waters and enforces an anti-pollution regulation. I think it is noteworthy that, in spite of the many oil production operations being carried out in the Gulf, there has never been a serious pollution incident--certainly nothing on the scale of the recent TORREY CANYON tragedy that led to the fouling of so many miles of English beaches. And so, we have another example of how compatibility between resource users--and uses--is actively maintained.

These two examples obviously contain a common factor. Both represent the use of laws and regulations to maintain harmony between those who make different uses of the same waters. And this points up an important lesson that we, in the Department's Marine Resources Development Program, drew from our study of the Gulf: the need for wise legislation as a foundation for total resource development. I cannot emphasize this need too strongly. In formulating the laws that will provide for future marine development, we cannot afford to concern ourselves with a single marine resource, ignoring the potential impact on others. This kind of preoccupation has caused no end of trouble on land, and it is a habit worth abandoning.

I am not a lawyer, but it seems to me that the process of abandoning this single-track approach has already begun. I think the Outer Continental Shelf Lands Act of 1953 was a step in that direction, and it is to this Act that we attribute much of the successful cooperation between those who utilize the various resources of the Gulf. Although the Act, as its name implies, is chiefly concerned with the mineral resources of the sea floor, it also concerns itself with the effects that exploring for those resources, and developing them, could have on the sea itself. I have already cited examples of how oil and gas operations in the Gulf are regulated with respect to shipping and marine life; both these relationships are specified in the Act. Another example may be more familiar to you. Last fall, a large fish kill was reported on the Georges Bank when underwater explosives were being used to gather seismic data in a search for oil. Under Section 11 of the Act, the Geological Survey's Conservation Division has decided to withhold, for the time being, any further permits for use of explosives in such activity. I should add that the Division is granting permits for other methods of exploration not potentially hazardous to marine life.

Clearly, this law recognized the essential interdependence of all activities aimed at using marine resources

The fact of this interdependence was not always so clear. On land, many years of struggle by dedicated conservationists were required to draw attention to it, and we are heartened to observe its application in laws relating to marine resources. It is my understanding that many more such laws will ultimately be required--especially with regard to international relationships in the open ocean--and I trust that this primary fact of interdependence will remain in clear focus when these laws and conventions are drawn up.

However, laws and regulations are meaningless without reference to those who must observe them. This truism leads to a second conclusion we have drawn from our study of the Gulf area: a real spirit of cooperation and mutual regard exists among those who are developing the various resources of the Gulf. This spirit may be founded on wise law, but it draws its energy from a vivid appreciation of the fact that all the users of the Gulf have mutual obligations and are capable of extending significant mutual aid.

The relationships of the oil and gas industries again may be referred to for examples. There is a very active organization, the Offshore Operators Committee, that works to maintain good relationships with other users of the Gulf and to reduce friction whenever it occurs. This Committee, which has been particularly effective in promoting friendly relations with the fishing industry, is a completely voluntary organization. It has not statutory foundation. Nevertheless, it plays an important role in maintaining the compatibility between users of the Gulf that has so impressed those of us involved in the Department's Marine Resources Development Program.

In fact, we have drawn a double lesson from our study of the Gulf. We are convinced that the twin keys to success in future utilization of the sea's resources are thoughtful legislation, on one hand, and intelligent cooperation among users, on the other. Both are necessary, both are rooted in the hard-won understanding that natural resources constitute a system and must be developed as such. We must remember this, especially when we extend our reach into the deeper seas and face the problems implicit in interactions among nations, as well as industries.

Considering the great variety of vessels needed to develop marine resources, from fishing trawlers to submarines, it would be ludicrous of me to suggest that we are all in the same boat. I don't think anyone will feel tempted to laugh, however, when I point out that in a very real sense we are all in the same sea. It is not our natural home and its dangers are real--but so are its treasures. We do well to cooperate in retrieving them.

PRESENT ARRANGEMENTS FOR FISHERY EXPLOITATION

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In this general conference on the "Future of the Sea's Resources" the special subject assigned to me for review is "Present Arrangements for Fishery Exploitation." In order to place the present (my subject) into better perspective, and also to help more clearly to project our thinking into the future (the conference theme), it might prove profitable to take a quick look at the past.

It has been variously estimated that man has been on earth in remotely recognizable form for about 200 thousand years. It took him all of that respectable period of time, including the first 1,900 years of the Christian era to cover the inhabitable part of the earth and increase his number to 1.5 billions.[1] From 1900 A.D. to the present, or during the lifetime of those of us in this room who have gray hair, man has been much more successful as a multiplier, since he has managed to augment his number by another 2,000 millions. To increase from 1.5 to 3.5 billions in two generations is not an inconsiderable feat in procreation and survival. It seems that this compounding will continue for another generation at least.

Fishing, with some other well-appreciated human activities, ranks among the oldest of professions. It is quite conceivable that even the most remote of our ancestors fished to obtain some of their food. Primitive fishing had to be carried on from shore or from canoes in rivers and in lakes, and along the fringe of the sea, rarely, if ever, out of sight of land. Fishing had developed only a little beyond this very primitive stage even to the time Columbus sailed a short 475 years ago. High-seas fishing developed slowly since Columbus' day. It was known in only a few places, such as the Grand Banks of Newfoundland, when steam replaced sail around the turn of the present century and was only slightly more prevalent when the internal combustion engine replaced steam in the 1920's and 1930's. From here on, development was faster.

The point to be made at this stage of our discussion is that man's almost precipitous need for a great deal more food because of his increasing number, and his capability for acquiring at least a part of this from the extensive and little-known ocean area, has developed for the most part during the first two-thirds of this century and, most spectacularly, during the two decades since the end of World War II. So no one really has had much experience in high-seas fisheries operations or in organization for their development.

Fisheries Jurisdiction

When the Constitution of the United States was being written nearly 200 years ago, jurisdiction over fisheries was assigned to the states, all original thirteen of which were maritime or, at least, had direct access to the sea. State jurisdiction worked quite well as long as fishing was carried on from shore or near shore. Complications began to arise only when fishing by increasingly mobile fishermen in search of better catches began in waters off neighboring states and on the high seas. Now with fifty states, many of them maritime, and with many more mobile fishermen at home and abroad, the problems created by such restricted jurisdiction are being multiplied.

But this is not all. Not only were fishermen now moving all over the ocean and among oceans, but the fish themselves and the waters in which they swam were found to be constantly on the move. Thus, as information on ocean currents and fish migrations increased, it became broadly apparent that a valuable salmon, for instance (as well as the water in which it lived and swam), could be off Alaska one day, off British Columbia the next, and off Washington, Oregon, and California soon thereafter. A salmon actually swims through several different jurisdictions and sets of fishing regulations on its way to spawn in the Fraser, the Columbia, or the Sacramento River.

State jurisdiction was found to have other shortcomings, too. Fisheries research, for instance, could not be effectively carried out by state institutions since the species under study were forever moving out of the area of jurisdiction where state funds could be used for research. Also, political expediency at the state level has been known at times to influence fishery regulations and management measures even more than the welfare of the fish. The progressive accumulation of politically motivated regulations have by and large favored inefficiency, and has resulted in institutional handicaps that have often arrested, if not completely paralyzed, fishery development.[2] Clearly, jurisdiction by states under these changing conditions was no longer effective. What then could be done to remedy the situation?

One attempt to overcome the obvious shortcomings of state jurisdiction was for a number of states to band together into what has come to be known as state fishery commissions. The first of these was organized on the Atlantic coast in 1942 and is known as the Atlantic States Marine Fisheries Commission. There is also a Pacific Marine Fisheries Commission and a Gulf States Marine Fisheries Commission organized at somewhat later dates. These state associations annually get together to consider fishery problems common to two or more states. On the basis of these discussions, each state could take independent action or agreed-to joint action with respect to the study or conservation of species in which two or more have a common interest. These commissions have been useful in providing a platform where state fishery administrators and their scientific advisors can meet and discuss their problems and, if appropriate, take joint action. However, I do not think that there is any responsible person dealing in fisheries matters who thinks that this formula has solved the jurisdictional problem.

If state and a combination of state jurisdictions are found to be inadequate, national jurisdictions, it appears, are only slightly if any better. Political boundaries of any size are for the most part meaningless in the study or control of natural phenomena. The tuna fishery of the eastern tropical Pacific, for instance, is at present

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[1] The Future Growth of World Population (New York: United Nations Department of Economic and Social Affairs, 1958).

[2] W. M. Chapman, Politics and the Marine Fisheries, Bureau of Commercial Fisheries Circular No. 250 (Washington: U.S. Government Printing Office, 1966).

prosecuted by fishermen of nine countries including Canada and Japan. The fishery covers an ocean area extending from southern California to northern Chile, a distance of some 4,500 miles, off the coasts of eleven countries and in two hemispheres. Neither state nor national jurisdiction proved adequate for the study and management of this fishery. Responsibility in this instance was passed on to an international commission whose accountabilities are for "stocks of fish" in an extensive loosely-defined area known as the "eastern tropical Pacific." This arrangement has worked very well as far as the more restricted surface-caught yellowfin tuna are concerned. It is not certain whether this large and elastic jurisdiction will continue to prove adequate when we know more of the relationships of the larger deep-swimming yellowfin (now being caught by Japanese longliners right across the Pacific) to the surface-caught yellowfin taken near the coasts of the Americas; or, when we know more of the distribution in time and space of the skipjack which occur seasonally in the eastern Pacific and which are believed to form a part of a larger stock extending at least to mid-Pacific. A shrewd guess would be that the eastern tropical Pacific delimitation as presently defined would not prove adequate for either research or management even for the two species specifically covered by the convention; and certainly not for other species of tuna that are known to make ocean-wide migrations.

Other important species of food fish have been referred to international commissions with convention waters either left quite general or else very rigorously defined. The two older (pre-war) and so far successful bilateral commissions between Canada and the United States dealing with Pacific halibut and Fraser River salmon immediately come to mind. So long as just the two prosperous and friendly treaty countries fished these resources in traditional places and with comparable gear, the formula worked very well. However, the formula broke down when it was demonstrated that Fraser River salmon, with treaty waters restricted to a limited fixed area near the river estuary, could be successfully and profitably caught in areas of the high seas as far as the mid-Pacific and that halibut could be caught successfully by fishermen from countries not members of the convention in extensive areas of the high seas but still in treaty waters loosely described as "the northern Pacific Ocean and Bering Sea." Under these circumstances the fishermen of non-member countries who had moved into the fishery had to be kept by agreement from fishing these species (as Japan now is) or by getting countries voluntarily to restrict their operations on the protected species, as the U.S.S.R. is more or less doing on a year-to-year basis now. These are at best temporary measures. Another alternative would be to invite other fishing countries to join the convention and to share the allowable catch. The latter formula, in the case of a common property resource, is probably the fairest and the most durable but in practice, in these two instances at least, it will probably only be adopted as a last resort.

As can be seen, even the regional jurisdictions accepted at present are breaking down as more and more fishermen from a variety of countries enter established fisheries, and as more and more is learned concerning fish distribution and the relationships of the fish stocks.

So far, however, in spite of the growing problems of species and area jurisdiction, the regional international fishery commissions have proven by all odds to be the most successful both in study and management of fish stocks. Although the pre-World War II bilateral commissions dealing with halibut and salmon between the socially and economically comparable countries of Canada and the United States are the ones usually pointed to with pride, there are multilateral commissions with many member countries varying widely in economic development, scientific sophistication and political outlook which also show signs of some success. A quick look at how this development in the international fisheries field has taken place may prove profitable in our efforts to plan for the future.

International Cooperation in Fisheries

Development of an international approach to the solution of high-seas fishery problems has occurred in two principal ways. The first involved cooperative planning and conduct of research only. Research was non-contentious and everyone seemed in favor of developing more information regarding a little-known but increasingly valuable resource. This, it was agreed, could best be done in international waters by joint planning and, if possible, by cooperative execution. Cooperative research required only the tacit agreement of the countries whose scientists wished to work together and no final or large commitments for programs or expenditures were needed.

The second approach, as we have already seen, involved not only research but management as carried out by the international commissions. Terms of reference here were more precise and agreements took on the form of formal treaties. Both developments occurred together and both survive to this day.

The Research Councils

As concentrated, mechanized fishing by the fleets of a number of countries first developed in the North Sea and adjacent waters, it was here where apparent overfishing of fish stocks first occurred. It was here, too, in response to an obvious need, where an international approach to cooperative research on high-seas fish stocks first developed. At the turn of the present century, an International Council for the Exploration of the Sea (known almost universally as ICES) made up of scientists of western European countries, was organized. This Council held its inaugural meeting in Copenhagen in 1902. Led by some of the leading marine scientists of the day, it proved an almost immediate success in encouraging sea research. Organizationally it was divided into both subject and area committees to carry out its cooperative planned research. Thus it has a Salmon and Trout Committee, a Hydrographic Committee and a Fishing Committee as well as a Baltic Area Committee, a Transition Area Committee, a Northeastern Area Committee, and so forth. The Council also standardizes, collects, and collates fishery statistics and hydrographic information, and publishes the results of its investigations and of the decisions taken at its Annual Meetings.

The importance of ICES and the influence it has exerted on the development of high-seas international fisheries research can hardly be exaggerated. The inspiration supplied by the success of this organization led directly to the development of similar research councils elsewhere. In 1919 a parallel organization was established by countries bordering the Mediterranean; in 1920 the North American Council on Fishery Investigations was organized for the northwestern Atlantic; in 1948 an Indo-Pacific Fisheries Council was started under the auspices of the Food and Agriculture Organization of the United Nations (FAO), and in 1949 a second General Fisheries Council for the Mediterranean, again

under FAO, was organized to give that area two councils. FAO also made some not too successful attempts to organize councils in South America and Africa but all of these did not take. Three regional fishery bodies are recorded, one in the south Atlantic (CARPAS), one in Europe (the European Inland Fisheries Council), and one in West Africa. Little besides the holding of occasional meetings has been recorded about them.

None of the subsequent research councils, however, embodied the inspiration and spirit of ICES. The latter, which has survived two world wars, is still a research force to be reckoned with, whereas some of the others have not even survived. The North American Council discontinued meeting after 1938, and the original Mediterranean Council became inoperative to the point where FAO organized another council for the area. Both are functioning at this moment but at a low key. The Indo-Pacific Council has met quite regularly but its measurable accomplishments are not impressive. The difficulties and general lack of interest encountered by FAO toward similar councils in Africa and Latin America, as well as the relatively high mortality experienced for this type of organization, serve as a measure of the effectiveness and popularity. All councils have provided a platform for scientists and fishery administrators of various countries on which to meet together, and to exchange ideas. They have also allowed participants to become aware of the international nature of the problem that, up to the time of Council formation, they had been wrestling with nationally and alone. None of the councils have been given operational or management responsibilities so their area of effectiveness and influence was to a degree limited by their charters. On the few occasions where council scientists also served as scientific advisors in a tight management situation, such as on the Research Committee of the Whaling Commission, their influence was not striking.

The Management Commissions

The second line of development included negotiation of formal fishery conventions which, in most cases, provided for the organization of commissions which, in turn, were assigned specific research as well as management responsibilities. There are a dozen or more such commissions operative today but no two are alike. They differ widely in organization, authority and problems, but most have an identifiable mission. Some have a fixed membership, as the bilateral commissions dealing with Pacific salmon and halibut. The tripartite North Pacific (Canada, Japan and the United States) and the bipartite (Japan and U.S.S.R.) salmon, and similar commissions belong in this group. Others are open-end treaties where any government can join if it has an interest and is accepted by existing members, e.g., the Tuna and Whaling Commissions. Some commissions deal with one species in a defined area such as the halibut "of the northern Pacific Ocean and Bering Sea" or the sockeye salmon of the Fraser River. Others deal with several designated species in a large area (e.g., herring, halibut, salmon, king crab, and such like of the North Pacific Treaty), while still others deal with many fishery problems in large regions such as the Northwestern and Northeastern Atlantic Commissions. Although these latter two commissions were designed to deal principally with demersal fish, almost any fishery problem can be assigned to them by special arrangement.

Prescribed treaty or convention waters also vary widely. Thus the Whaling Commission for all practical purposes takes in all the world ocean where whales [illegible], whereas all other commissions are variously restricted to a part of one ocean. The Tuna Commission, as we have already seen, is limited to the general area described as the eastern tropical Pacific, and the sockeye salmon commission is restricted to treaty waters near the Fraser estuary even though the Fraser River salmon travel and can be caught on the high seas to as far as the mid-Pacific. The North Pacific Fisheries Convention, on the other hand, which also deals with salmon, defines its convention area as "all waters, other than territorial waters, of the North Pacific Ocean, including adjacent seas."

Also varying widely are the principles that guide the selection of commissioners by the various member governments as well as the definition of the appointive authority. In Canada and the United States the appointive authority has been nationally established as the highest in the land, namely Her Majesty, on the recommendation of the Governor-in-Council in Canada, and the President of the United States. In Canada, this "summit" appointment automatically gives the "government" commissioner, who usually is a ranking officer in the Department of Fisheries, considerable leeway in negotiation and even in the commitment of moneys, usually within the limits of reasonable budgets presented in advance. In the case of the United States, this freedom is more restricted, as money commitment cannot be made even if requested by the President himself, since there is no assurance at all that Congress will support the request; in fact, experience has shown that very often Congress will not. In the case of most other governments, the appointment or nomination of commissioners seems to be more casual. Almost always a ranking officer of the fishery administration and, at times, scientific or industry advisors appear as commissioners, but candidates from the military, finance office and foreign affairs are by no means unknown.

The main point to be made here is that although the number of commissioners is fixed by the conventions, rarely if ever is the composition of the commission, its actual authorities or how or by whom commissioners are to be appointed or their qualifications spelled out in the convention. In fact the legal status of the commission itself is very often quite unclear.

With this great variation among existing commissions, it is difficult to catalogue them in any useful way. For the present purpose, however, I am going to consider the commissions from two general points of view only, namely, on the basis of when the conventions were negotiated, and how and by whom research and management responsibilities assigned to the commission are carried out.

The Commissions in Point of Time

The first formal negotiated convention to deal with the study and conservation of a living marine resource was the Fur Seal Convention of 1911. This convention was accomplished among Canada, Japan, Russia, and the United States at a time when the four governments involved differed broadly from the same four today. The convention grew out of the decimation by unrestricted pelagic hunting of North Pacific fur seal stocks. The agreement proved successful in restoring the fur seal through protection and selective harvest, but the commission was light on research. One of the principal lacks in this field was a measure of the effect that the greatly increased fish-eating seal herds had on other important food fish. This lack, coupled with inadequate studies in population dynamics, caused a loss of confidence by at

least one member, Japan, and the treaty became inoperative in 1941. The treaty was re-negotiated after World War II by the same governments that belonged to it before but with much more directed emphasis on coordinated national research programs. It is operative today.

The Fur Seal Convention is the oldest of the "fisheries" treaties. Since it has survived (with the exception of the recess during the war years mentioned above) two world wars, revolution, conflicting ideologies, enmities, and friendships for fifty-five years, and as it has been reasonably successful in accomplishing its mission and satisfying its members, it must have some built-in survival qualities that are worth examining. We might take another look at this a little later on.

The only other fishery conventions that were negotiated and had commissions placed into operation before World War II (a much simpler world than exists today) were the two apparently signally successful bilateral commissions between Canada and the United States, each dealing with one species, namely, the halibut of the "northern Pacific Ocean and Bering Sea" (1924), and the sockeye salmon (and later pink salmon) of the "Fraser River system" (1937). There are several contributing reasons why these commissions have proven so successful.

One reason for their success was that responsibility for study and restoration was for one prized species only and, in each case, the species had been fished down to the point where any improvement would be much appreciated. Other characteristics that contributed toward success were that the two member countries had a common ancestry and language, and a similar currency, and that they were at a comparable stage of scientific, economic, and social development. Also, they used similar fishing gear and had grown accustomed to fish together on the high seas and near state and national boundaries over a number of decades. Still another reason, and in my view an important one, for success, was that each of these conventions specifically provided for an international research staff for the commission itself, so it could vigorously pursue those researches it considered most pertinent. As the scientific staff members were the direct employees of the member governments, doubts as to the authenticity of the scientific results presented to the commissioners were minimal, and in these two instances at least, results of researches have never been seriously questioned. Also both commissions were quite liberally supported for the mission they had to carry out.

All the other fishery conventions (except one or two minor ones in the North and Baltic seas) were negotiated and entered into force after World War II, and hence have hardly had time to prove themselves finally one way or the other. However, some have shown that the formula adopted to solve their specific problem has not worked well. An example of this is the Whaling Commission (negotiated in 1946 with inaugural meeting in 1949) having about seventeen present members, under whose auspices the whales, especially in the Antarctic, have progressively been reduced to the point where now only residual and marginal whaling is carried out by a few countries. The Whaling Commission had no scientific staff of its own and relied on members of the Whaling Committee of ICES, who also served on the Research Committee of the Commission, for its scientific advice. Very little independent research was carried out and most of the scientific advice given was ignored in the interest of competitive catching of as many whales as possible.

Other postwar commissions, on the other hand, such as the one created by the International Convention for the Northwest Atlantic Fisheries (ICNAF) (signed 1949 and inaugural meeting 1951) have encouraged the agencies of some of their member governments to carry out substantial high-quality research in its area of interest and have programmed cooperative ocean surveys. ICNAF, with thirteen members from Western Europe and North America, has several members scientifically sophisticated enough to understand the research carried out, even if all members cannot or, at least, do not always effectively participate. Recommendations to regulate mesh sizes have been made and, in some instances, enforced with some success. The real test of commission strength will, however, be made when hard recommendations on catch quotas and limitations will be required. ICNAF has carried out its general research responsibilities quite well so far.

Another postwar convention is one that goes by the inordinately long name, in a company of long names, of "The Convention for Regulation of the Meshes of Fishing Nets and the Size Limits of Fish" (signed 1946, effective date 1954). Present membership includes about fifteen Western European countries. The convention provides for no research or research coordinating body of its own; specific conservation measures are spelled out in the convention as well as in the long title. ICES serves as the scientific fact-finding agency of the commission. It has met with indifferent success.

Still another postwar convention was negotiated among Canada, Japan, and the United States to deal with North Pacific Fisheries. The International North Pacific Fisheries Convention (INPFC) was signed in 1950 but due to political stresses an inaugural meeting of the Commission was not held until 1954. This treaty concerns itself with salmon of North American origin on the high seas as well as with other species. A companion but separate treaty (1956) between Japan and the U.S.S.R. treats principally of salmon of Asiatic origin on the high seas (mostly concerning catch quotas). Salmon originating from the two continents intermingle on the high seas in certain localities of the mid-Pacific where they are caught together, principally by Japan. This, as well as the existence of two conventions with overlapping memberships dealing with essentially the same problem, introduces complications. Further, a new principle called "abstention" was introduced in the tri-partite North Pacific treaty. This principle postulates that new countries entering a fishery should abstain from catching species already demonstrably being exploited fully by countries already fishing them. The principle as presented was not considered as one worthy of general acceptance by United Nations Conferences in 1955 and again in 1958 and 1960. In modified form, of course, this principle has been in force in the Fur Seal Convention since 1911 where Canada and Japan have agreed to "abstain" from pelagic sealing, but in this case the abstainers were compensated for their sacrifice by being given a portion of the harvest. This "compensation for abstention" principle was at least one of the ingredients hinted at above that contributed to the success and long life of the Fur Seal Convention.

All researches under INPFC are carried out by agencies of member countries, with programs coordinated by the Commission at its annual meetings. Some researches that touch the interests and the sensitivities of members are vigorously contested. They are only passed and reported upon after long joint working party sessions between scientists of all countries and then only if their usually toned-down results are found acceptable to the government heads of the

commission. This system of conducting and/or coordinating research is not to be widely recommended. The convention itself and the commission's operations have been under review by member governments now for a number of years. No new formula acceptable to all members has yet been arrived at, so the commission grudgingly persists in meeting year after year under the old formula for want of agreement on anything better.

Another postwar convention which I will just mention was one negotiated among Chile, Ecuador, and Peru in 1952. The commission, known as the "Permanent Commission for Exploitation and Conservation of the Maritime Resources of the South Pacific," held its inaugural meeting in 1954. Although the commission meets irregularly, its 1966 meeting in Paracas, Peru, was its ninth. The objectives of the commission are "to secure a better exploitation and conservation of the maritime resources of the South Pacific,..." The three member countries each now have scientific fishery institutes in varying stages of development. There are no signs, however, that this commission is particularly science-oriented.

The last of the postwar commissions that I will mention here is the Inter-American Tropical Tuna Commission (IATTC). This convention was negotiated and signed in 1949 by the Republic of Costa Rica and the United States, and its inaugural meeting was held in 1950. This was an open-end convention and Panama, Ecuador, and Mexico joined later, in that order. Canada has applied for membership, and at least two more Latin American countries have this year shown an interest in joining. The objective of the convention is to study the tunas and tuna-baitfishes of the eastern tropical Pacific and, when appropriate, to recommend conservation measures. Following some scientifically-demonstrated overfishing, a catch quota was recommended in 1962 and each year thereafter. The recommendations were not generally accepted and implemented by the nine governments whose fishermen fish in the area (including non-member countries Canada and Japan), until 1966. So far, this commission has had only one year of experience in actually regulating this two-species (three if bigeye is included) high-seas pelagic fishery which extends for 4,500 miles off the coasts of eleven countries. Much remains to be learned about this complex undertaking but experience so far indicates that there is nothing about the performance that should prove impossible.

This convention is the only one of the post-World War II conventions that provides for a commission with an internationally-recruited research staff under commission control. This feature has proved very important indeed since there was a large discrepancy in scientific sophistication, economic development, and fishing experience among member countries. With the independent international research staff, and with research results being fully and promptly published in the commission's two official languages and widely distributed, the findings of the commission have been accepted without more than the usual caution by all member and non-member nations that fish in the area. Furthermore, since each country's financial contribution to the commission is dependent on its catch and utilization of the species under study and management, member countries with small fisheries have found to their satisfaction that they are full members of a competent scientific organization on which they can call for scientific advice and guidance at any time and at relatively small cost to their treasury. It is doubtful indeed if the advances in research and in conservation made over the past sixteen years by this commission could have been made if it did not possess a scientific staff of its own. Conversely, if the only scientific information available to commission members and non-members fishing in the area was from one or two of the more prosperous and scientifically-sophisticated national sources, it is unlikely that the confidence so widely exhibited in the results of this complex research as well as the acceptance of hard conservation measures could have been attained.

World Organizations

It appears to me that if there is any area of activity that deserves special attention at United Nations or United Nations Specialized Agency level, it is the study and development of the ocean. This is especially so since this little known, large fraction of the world, which holds so much promise in helping to solve many of mankind's resource and general living problems, belongs to all the world's peoples. In spite of this, the subject has received only casual attention at the world level. Even where some provisions for fisheries and ocean study is provided in specialized agencies, the administrations handling these activities are hidden away in organizations with overwhelming other responsibilities.

Even at the national level, there are only a few countries such as Iceland, Norway, Denmark, Canada, and the U.S.S.R. that have provided special central government departments or ministries for fisheries; practically all other governments have their federal fisheries administrations tucked away in a variety of departments. For instance, Peru's fisheries administration is a small service in the Department of Agriculture, Japan's is an Agency in the Department of Agriculture and Forestry, and the United States' is a Bureau in the Department of the Interior. Yet these are three of the most important fishing countries in the world. It appears rather obvious to me that the philosophy of these "interior" departments that deal with enormous national land problems must be almost diametrically opposed to the philosophy that must deal with the use and development of a common-property resource that occurs in a constantly changing medium and in an immense internationally-owned area of the world.

In spite of this obvious ineffectual national experience, when United Nations Specialized Agencies were considered, fisheries and oceanography were again given small recognition and were placed in agencies whose principal responsibilities lay in other, and not necessarily related, fields. Thus a small Fisheries Division was provided in the Food and Agriculture Organization of the United Nations (FAO) and an Office of Oceanography (as an afterthought) in the United Nations Education, Scientific and Cultural Organization (UNESCO). FAO's Fisheries Division (Department after January, 1966) has been in existence since October 16, 1945, when FAO was first organized. It has served a very useful purpose in compiling fishery statistics on a world basis and in calling and servicing international fisheries meetings. As already noted, it has also organized some international fishery "research" councils that are functioning indifferently. Operationally, however, the FAO Fishery Division or Department has never achieved the support or success of either of the land-oriented Agriculture and Forestry Divisions in the same organization.

As executing agent of Special Fund fishery projects, the Fisheries Department has had only indifferent success; as a leader in national and regional fisheries development its influence has been minimal, as witnessed by the latest Atlantic Tuna Convention negotiated under FAO auspices and signed by seventeen delegates on May 14, 1966. The convention still has to be ratified by the requisite number of governments before it enters into force. Although this proposed new convention was carefully considered by two special working parties convened by FAO and by that organization's Council and by its Conference, and by a special Conference of Plenipotentiaries called to Rio de Janeiro in May of 1966, the final document shows very little indication of knowledge of past experience either good or bad in this field. For instance, the Convention states "the Commission shall be responsible for the study of populations of tuna and tuna-like fishes...and such other species of fishes exploited in tuna fishing in the Convention area as are not under investigation by another international fishery organization." This is a large and all-inclusive order and a heavy responsibility placed on the Commission, especially when it is realized that in addition to the numerous species to be investigated, the Convention area includes "all waters of the Atlantic Ocean, including the adjacent seas." Yet to carry out these broad instructions, the Commission must "insofar as feasible, utilize the technical and scientific services of, and information from official agencies of the Contracting Parties and their political sub-divisions...." With seventeen (or more) potential members, varying widely in economic, scientific, and political development, this formula could lead to an impasse here as it has already in other areas under even more favorable circumstances. The legal status of the Commission and the method of appointment or authority of commissioners was left to chance as formerly and even in describing treaty waters in the convention area as "all waters of the Atlantic Ocean including adjacent seas" albeit enormous in extent, was still based on loose geographic boundaries rather than on an ecological area where tuna live and grow.

The United Nations Educational, Scientific and Cultural Organization (UNESCO) on the other hand, had its constitution formally accepted in 1946. This organization has overwhelming educational responsibilities. Partly it seems because "science" was included in her all-inclusive title, UNESCO appointed, among other committees, an Advisory Committee on Marine Science in 1955. She entered the oceanographic field, largely by default, in about 1960 since no one else seemed to be interested in this fast-growing arena; that is, no one was until UNESCO moved in. The Intergovernmental Oceanographic Commission (IOC), was organized in 1960 under UNESCO's auspices. The IOC meets annually and it helped in the coordination of the not too well coordinated International Indian Ocean Expedition, but so far this organization has not proven a real force. Some energy is expended by FAO and UNESCO in jurisdictional disputes or in setting up advisory committees to mediate disputes over who should be doing what in this field. However, the one certain thing, in my view, is that the combined efforts of these two great world organizations, with demanding other tasks, are not adequate or competent to supply the inspiration and guidance required for the development of the world ocean or its fisheries.

Summary and Conclusions

The three-quarters of the world that is covered by ocean has traditionally been considered of such small value that no one has bothered to lay claim. For centuries it served principally as a medium on which to sail ships. To allow freedom to sail, the concept of the "freedom of the seas" was enunciated, and for centuries stoutly defended. This latter concept further confirmed the international nature of the sea and, by inference, the common-property nature of its heretofore little used resources. This is where we found ourselves at the turn of the present century; we have developed very little since except as the demand for ocean resources grew and our capability to exploit the resources increased, values began to change. Ocean grabbing has in recent years become stylish, as land grabbing in the new world was a century ago. Even very responsible countries are threatening to lay claim to bays, to seas, to wider and wider territorial waters and to wider and wider fishery zones.

State and national fishery jurisdiction in recent years have largely become obsolete. International regional fishery agreements intended to correct this have grown up haphazardly and, under rapidly changing conditions, are in need of prompt revision.

No competent world organization exists, except perhaps the United Nations itself, to which we can look for guidance. It was after all under United Nations auspices, not that of its specialized agencies, that the world "Conference on the Living Resources of the Sea" was held in 1955. It was at the 1958 "Law of the Sea Conference" also held under United Nations auspices that "the Convention on Fishing and on the Conservation of the Living Resources of the High Seas" was negotiated. These conferences are by all odds the most important ever held in the fisheries field and supply whatever guidance we have for future progress and development. The very recent United Nations Resolution on "Development of Natural Resources of the Sea" of December 8, 1966, seems to continue this leadership largely, I am sure, because of the bankruptcy in leadership in other United Nations bodies.

To my knowledge there is no one or no organized body with the exception of this Law of the Sea Institute, holding only its second meeting, and its Directors acting individually, who are engaged in an independent audit and appraisal of past organization and performance, nor is anyone except the personnel of this organization doing any serious thinking or laying plans for the future. This important development should not be left to chance. I must hasten to add, however, that I think this utter neglect has in recent months been showing signs of change.

In short, it is my view that present arrangements for fishery exploitation are inadequate. Perhaps some suggestions will come at the June 29 meeting of this group as to what can be done to improve matters.

DISCUSSION

It was pointed out that some of his criticisms of FAO activities are now being met through recent changes in the vigor and emphasis that fisheries is receiving in FAO. It was also noted that one possible means of meeting his objections to the current pace of international activities might be through implementation of the NASCO recommendation that FAO, UNESCO, certain portions of IMCO, and certain functions of WMO be put into a new specialized agency--a World Oceanographic Organization.

THE FUTURE OF THE GENEVA CONVENTION ON FISHING AND THE CONSERVATION OF THE LIVING RESOURCES OF THE SEA

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Last year at the first Conference of the Law of the Sea Institute, at the end of my paper on the "1958 Geneva Convention on Fishing and Conservation of Living Resources," I commented as follows:

> "Now, eight years since the Geneva Fisheries Convention was negotiated, we must admit that much of the world has not yet caught up with its provisions, in practice at least. With this in mind the United States has recently begun to talk up a proposal that the FAO convene a World Fishery Conference that would consider, among other fishery matters, how the convention could be most effectively implemented and encourage more ratifications. Such a conference could also consider auxiliary procedures, such as the development of joint enforcement measures, which would make the provisions of the Geneva Convention more effective."

I understand that the informal reaction to this sounding out from fisheries people of other countries has been something less than enthusiastic. You should keep this reaction in mind in connection with some of my later comments on the possibility of improving the convention.

I have been asked to discuss at this conference the future of the Geneva Fisheries Convention. I propose to approach the subject by first considering what countries have ratified the convention, speculate on the reasons behind their action, and then discuss the possibilities of further accessions and the likely motivating considerations. This will point up some of the strengths and limitations of the convention and the modifications needed to make it more effective. It will also provide a background for evaluating the possibility of achieving these modifications and, failing this, possible alternatives.

Who Accepted the Convention?

As of June 1, 1967, the following countries were parties to the Geneva Fisheries Convention:

Australia	Haiti	Mexico	Sierra Leone	Uganda
Cambodia	Jamaica	The Netherlands	South Africa	United Kingdom
Columbia	Malagasy Republic	Nigeria	Switzerland	United States
Dominican Republic	Malawi	Portugal	Trinidad and Tobago	Venezuela
Finland	Malaysia	Senegal		Yugoslavia

The combined catches of these countries in 1965 made up about 14 per cent of the world total. Three of the countries accounted for more than two-thirds of this 14 per cent, the next four accounted for about one-fifth, while the remaining seventeen produced about one-eighth. The average catch of the seventeen was about 50,000 m.t. each. Only three countries--the United States, the United Kingdom and South Africa--together accounting for about 10 per cent of the world total, generally would be classed as major fishing countries.

Why have these countries become parties to the convention? I expect mostly because they favor the development of an international fishery regime based on law and order and consider the Geneva Fisheries Convention, while not fully satisfactory, is an improvement over the existing situation. Few of them will have their current problems substantially helped or hindered by the convention in its present form. The majority I expect made no sophisticated analysis of the impact of the convention on their long-range fishery interests.

Now Let Us Consider the Non-Members

The reasons why these countries have not become parties to the convention are more varied and perhaps in many cases more deep-seated than the reasons for most ratifications.

One group led by the U.S.S.R. presumably favors most of the provisions of the convention. However, the members of this group will not accept the requirements for obligatory settlement of differences concerning the conclusions to be drawn from scientific data bearing on the need for and nature of conservation measures. (Yet without this provision each country if it desires to prevent or delay action on regulations, is free to bicker as long as it wishes regarding the conclusions that should be reached concerning conservation requirements.)

There is another group of countries made up largely of coastal states which would like to have broad jurisdiction over the fishery resources in waters adjacent to their coasts. They do not join primarily because they fear that such accession would handicap their efforts to develop such broad jurisdiction.

A third group is made up of conservatives, mostly sophisticated European fishing countries (and Japan), which hold back official recognition of any special rights of the coastal states for fear it will adversely affect their overseas fishing operations. However, some of this group with substantial coastlines (and coastal fisheries) of their own may be experiencing growing internal conflicts as their long-range fishing operations are increasingly and effectively challenged by competition from relative newcomers to long-range high seas fishing, and their coastal fisheries suffer increasingly from the aggressive operations of these same newcomers. If the position of such countries should change, it

probably would be to support measures that would give substantially more protection to established inshore fisheries than does the present convention.

There is still a fourth group which is made up of countries that generally favor the provisions of the convention but are not at present involved in any serious fishing controversy or, if they are, do not see that the convention would provide any near time help in solution of their current problems. Since the convention has not been accepted (and is not likely to be) by an overriding majority of countries, including most of the substantial fishing countries, its provisions do not have the force of international law. They apply only to those who are members of the convention and this group does not include most of the parties to current major fishing disputes. In such disputes the convention at best serves as a guide or precedent. For this reason the party to the dispute whose position is most at odds with the general provisions of the convention, is less than ever inclined to join up for fear of strengthening the position of the other party. Meanwhile this other party can see little to be gained from joining since the provisions of the convention would not be binding on the non-member.

Countries not involved in fishing disputes generally lack urgent and practical incentives for accession. In such situations we often find action on accession rather low on the priority lists of their Foreign Offices where it must compete for attention with more pressing and in their view more practical matters.

If fishery disputes could be taken to the World Court for settlement in fact as well as in theory, some countries would have a substantially greater incentive to accede to the convention, for the greater the membership the more influence its provisions would have on the Court. However, such disputes rarely reach the Court, for one party or the other which is dubious of the soundness of its case under international law (as influenced by the 1958 Law of the Sea Converence and resulting convention), refuses to make use of the services of the Court.

To substantially alter this membership situation would require some new development that would provide a practical incentive for immediate action (such as the discovery of gas and oil in the European continental shelf did for the Continental Shelf Convention). At the moment I do not see such a development on the near horizon and therefore conclude that we are not likely to soon see any substantial number of new accessions, certainly not enough to give the convention the force of international law.

For these reasons the principal effect of the convention will continue to be its moral and technical influence. By and large countries will continue to seek solutions to their fishery problems through bilateral and multilateral agreements which from time to time may borrow provisions from the Geneva Convention. For example, the setting up of an independent committee of experts in population dynamics by the International Whaling Commission, which played a key role in initiating a realistic conservation program for the Antarctic whale stocks, could not have been engineered except for the precedent of the 1958 Geneva Fishing Convention. (Progress on this program has been seriously handicapped by enforcement problems.) Furthermore, because of the status of the convention, deriving from its origin in a Law of the Sea Conference convened by the United Nations and the strong support it received at that conference, most responsible fishing countries involved in fishery controversies will seek to develop positions which are not inconsistent with the general provisions of the convention.

Limitations on Effectiveness

The primary limitation on the effectiveness of the convention stems from the limited membership I have just discussed. However, even should this limitation be removed by a flood of ratifications, other serious limitations would remain.

One of the most serious is the lack of provision to handle the problems generated by large numbers of fishing vessels operating together in fleets. Such fleets have the capacity to rapidly concentrate tremendous fishing power on one area or stock of fish, and just as rapidly to shift this power successively to other areas at distant or intermediate points. Where the fish stock is relatively limited in numbers such a concentration can rapidly reduce the availability of fish to a level indicating severe and at least localized and temporary overfishing. If this stock is relatively independent of the stocks in other areas it may take years to recover. If there is considerable intermigration between this stock and those in nearby areas, it will recover more rapidly, provided adequate conservation measures are adopted and the other stocks are not similarly reduced. The mobile fleet of large vessels is not particularly handicapped in this situation for it can move to other areas (provided massed fishing intensity has not similarly over-fished those areas). However, the smaller, short-range coastal vessels may be severely affected, for they must continue to make their living from the nearby fishing grounds. Under this system the massive long-range fishing fleets presently would dominate the coastal fisheries even though they may not provide the best means for harvesting the resources, either economically or socially.

This is a relatively new problem, at least in the Western Hemisphere, and the Fisheries Convention provides no remedy. It cannot be argued in defense of this new fishing method, at least when the coastal fishery already is making full use of the resource, that large boat fleet fishing will add to the world food supply, nor can it generally be argued per se that such long-range fishing is more economic than coastal fishing. Unless effective provisions can be developed and applied which will prevent long-range fishing operations from destroying or seriously damaging coastal fisheries, many countries will look to other vehicles than the Fisheries Convention for a solution to their problems for I do not believe that the countries of the world will allow the general destruction of coastal fisheries by fleet fishing. For those interested in securing full utilization of the world's fishery resources to feed a hungry world the problem will be to secure a solution that gives adequate protection to coastal fisheries without resulting in extensive under-utilization of the coastal resources.

A second major shortcoming of the Fisheries Convention is the lack of enforcement provisions. Under the present convention even when countries through painstaking research, long drawn out discussion, and painful and sometimes debilitating compromise, finally reach unanimous agreement, there is no machinery for assuring the enforcement of the

measures agreed upon. This defect is becoming increasingly important as long-range fishing operations increase and fishing vessels operate at long distances from their own coasts and the fishery enforcement vessels of their own country. Efforts to secure agreement on joint enforcement measures, which would increase immeasurably the prospects for effective enforcement, have been unsuccessful except in the case of a few specialized fisheries (North Pacific Fur Seal Convention and the International North Pacific Convention in cases involving abstention; under these conventions arrests for violations can be made by any Party, but prosecution takes place in the flag country.) The United States delegation to the 1958 Geneva Conference on the Law of the Sea sounded out the prospects for including provisions for joint enforcement in the Fisheries Convention but encountered such strong opposition that no formal proposal was made. About the most that can be said of efforts since the 1958 Conference to secure agreement on joint enforcement provisions is that in some instances there has been partial agreement in principle, but none in practice. (Very recently efforts in the North Atlantic seem to be making limited progress.) In the absence of agreement on measures for international enforcement, joint enforcement, or at least effective international observers, the world must depend on the honor system. By and large international honor systems have left much to be desired. Furthermore, even when the will is present, it generally is impossible for a country to control in detail the activities of its fishermen when they operate thousands of miles away off the coasts of other countries.

A third limitation on the effectiveness of the Fisheries Convention stems from delays in getting agreement on and implementation of needed and effective conservation measures, particularly when one or more of the parties wishes to prevent or delay any restriction on the operations of its fishermen. This limitation is similar in kind but substantially less in degree than that in most present international fishery agreements. The drafters of the Fisheries Convention strove mightily to resolve this problem, and they did so up to a point. There are many ways of stalling. Perhaps the most sophisticated is to require an absoluteness of supporting evidence which as a practical matter is impossible to achieve or which requires such a span of time and expenditure of scientific skill and financing that excessive damage is done to the resource before agreement is reached and implemented. The Antarctic whale resource is a striking example. The groundfish of the Northwest Atlantic may be another.

The Geneva Fisheries Convention pioneered a number of measures designed to resolve this problem. Time limits are set for reaching agreement on necessary conservation measures and provision is made for referral of the question to a special commission of experts when the time limits are not met. Furthermore, in urgent situations in coastal waters, the coastal state is authorized to regulate unilaterally pending a determination by the special commission. These provisions of the Fisheries Convention are a great advance over preceding fishery agreements and probably would assure a speed of decision-making generally adequate for fishery developments of ten years ago. However, the tempo of fishery development and exploitation has accelerated since then, and with increasing attention being directed to utilization of the ocean's resources the acceleration is likely to continue.

Now to sum up the limitations on the effectiveness of the convention: First of all and most important, the parties to the convention are not at present adequate in number and makeup to give it the status of international law. Consequently its provisions for determining conservation measures and expediting action can be applied only among those party to the convention. They make up a relatively small club which does not include both or all of the participants in most of the current and urgent international fishing problems. Unless this shortcoming can be remedied, then other modifications to make the convention more effective will have no very great impact.

Correction of the other principal shortcomings--control of the impact of massive long-range fleet fishing on developed coastal fisheries, international enforcement provisions, and speeding up action on needed conservation measures, all require modifications which would make the convention less acceptable than at present to some countries. Thus efforts to strengthen the provisions of the convention to a substantial extent operate at cross purposes with efforts to increase membership. If time were available as in the past to laboriously work toward these improvements they might in time be accepted. However, the rapidly growing world population with its pressure for more food and other raw materials which the sea can supply (at a price) is not likely to grant time as in the past for the slow evolution of international fishery procedures.

As science and engineering develop economic means to make use of the ocean's resources pressures will increase to establish a legal system that will make such use practicable. We are seeing how rapidly this is taking place with resources of the continental shelf once the family of nations settled the jurisdiction problem in a way that made it practical and attractive for investors to commit large sums of money and brains to exploration and development of the latent resources of the sea bed. The problems of development, management, and control of the ocean's resources increase rapidly in complexity as we move from mineral resources, to immobile living resources (for example, pearl oysters), to living resources which move in constant contact with the sea bed (king crab), to living resources which swim but within a relatively restricted area (flounders), to those which roam over great areas of the high seas (skipjack). Nevertheless, I have no doubt that man will learn to develop and manage these resources with suitable allowance for their intermingling stocks and overlapping ranges in such a manner as to maximize the overall yield. Where actual "sea farming" is possible (increasing the productivity of a stock of fish, invertebrates, or sea weed, through improved breeding, feeding conditions, environment, and so forth) experience teaches us that the responsible individual or organization must have control of the operation and of the harvest if the project is to realize its potential. If we are to succeed to any major degree in realizing the great potential of the oceans about which so much now is being said, I would judge that both international law and domestic law must evolve toward a greater degree of individual or group ownership, or at least control. The longer and more bitterly the overseas fishing countries (those who fish principally off the coasts of other countries) resist this development the more extreme and arbitrary the final solution is likely to be.

The world appears to be ready, in a scientific and technical sense, for a major advance in fuller utilization of the resources of the oceans. Perhaps the principal remaining legal (or political) question regarding jurisdiction is: Will this problem be resolved "de facto" or "de jure"?

IMPLICATIONS FOR THE FUTURE DISTRIBUTION OF THE SEA'S RESOURCES IF PRESENT REGIMES CONTINUE IN FORCE

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The burden of this paper is to predict "The Future Distribution of the Sea's Resources if Present Regimes Continue in Force." The general theme of this panel and its previous papers prompt a limitation to fisheries resources, even though the anticipated escalation of exploitation of non-fisheries resources will no doubt influence future fisheries distribution.

For example, national states, including the United States, have established exclusive military zones and bomb test areas, conducted seismic tests, and so forth, on the high seas. Fishing has been prohibited or restricted in specific areas, and some of these activities may reduce fish stocks. Fisheries agencies have registered concern, if not alarm, over these developments and have taken steps to minimize or eliminate destructive forces. Exploitive enterprises for other resources will undoubtedly increase in numbers and volume of activity, in some cases threatening water pollution, competition for space, and possibly other activities which would be detrimental to fisheries.

The papers and discussions of this Law of the Sea Institute have employed the terms "distribution" and "regime" with a congeries of meanings, sometimes vaguely, sometimes ambiguously. In the context of this paper, distribution of fisheries resources might refer to the abundance which occurs in specified water areas as determined by nature and as implemented by man. Distribution could also refer to the value and volume of fish captured by areas, by species, and by classification of fishermen (in practice, most often by nationality). Finally, distribution might relate to an allocation of resources by mutual agreement (private or public) or by the mandate of a superior agency of government.

Since this paper reflects the perspective of the social sciences and particularly political science, the measurement of levels of abundance and prospects for increase or threats of depletion will properly be left to the fisheries scientists. This paper will relate particularly to the distribution of capture by fishermen on the basis of nationality as determined by political, legal, administrative, and other social forces which more or less precisely can be called regimes. Politics has been defined as "Who gets what, when, and how." We are concerned with which fishermen get what species, in what volume, in which places and how--by unrestrained competition, mutual agreement, or allocation of quotas.

Unfortunately, few social scientists have related their research and their writing to fisheries. The greatest volume of research has been conducted by scientists or lawyers (or political scientists with an international law orientation). Economists have more recently devoted their attention to fisheries, but extensive empirical studies are rare indeed. A few political scientists and geographers have more recently related their disciplines to fisheries. Other social scientists are rarely, if ever, involved. The adequacy and accuracy of predictions of future distribution of fisheries resources must consequently be qualified because social forces influencing fisheries have neither been fully assessed nor their impact precisely measured or predicted.

As we hazard a look into the future, a mirror revealing the past should serve as a more reliable guide than the medium's crystal ball. Since the "present regimes" of our topic have been essentially the same during the past ten years, an awareness of the distributional changes which occurred during this decade along with a determination of the factors responsible for these changes will at least suggest trends or potentials for changes in distribution during the next ten years.

During the decade ending in 1965 the total volume of the world catch increased every year from over 30 million metric tons in 1956 to 52.4 million metric tons in 1965, an increase of 71.8 per cent.[1] This increase was distributed unequally by continents as shown by the following scale (approximate figures in million metric tons).[2]

Continent	1956	1965	Peak Year If Not 1965
Oceania	.1	.1	
Africa	1.7	3.0	
North America	4.35	4.3	4.5 (1962)
U.S.S.R.	2.6	5.0	
South America	1.0	9.0	11.0 (1964)
Europe	8.3	10.75	
Asia	11.8	20.0	

[1] Yearbook of Fishing Statistics, United Nations, Food and Agriculture Organization, Vol. 20, 1965.

[2] Ibid., p. XXIV.

The percentage capture by continents follows:[3]

Continent	1956	1965	Peak Year If Not 1965
Oceania	0.3	0.3	0.5 (1959)
Africa	6.4	5.9	6.6 (1957)
U.S.S.R.	8.6	9.5	
North America	14.3	8.5	14.3 (1956)
South America	3.0	17.1	21.2 (1964)
Europe	27.1	20.6	27.1 (1956)
Asia	40.3	38.1	44.5 (1958)

To summarise: Oceania and North America showed little change in production. Volume increase was greatest in Asia (8.2 million metric tons) and South America (principally Peru--8 million metric tons). Percentage increase was greatest in South America--900 percent, U.S.S.R.--92.3 per cent, Africa--76 per cent.

Significant shifts in volume and percentage among the six leading producers also occurred. Peru registered the greatest gain from 0.322 million metric tons in 1956 to 7.462 million metric tons in 1965 after a peak in excess of 9 million metric tons in 1964. Peru became the leading world producer in 1962 and maintained the top position through 1965.

Japan ranked first in world production from 1956 to 1962. Since 1962 she has held the second position. Japan produced 4.77 million metric tons in 1956 and 6.88 in 1965. Japanese production climbed steadily until 1962 followed by sharp declines for two years, then a sharper return to the peak year in 1965.

Mainland China reported impressive increases from 1956 to 1960--from 2.648 to 5.8 million metric tons. The FAO Yearbook of Fishery Statistics deletes figures for China after 1960. Figures reported through 1960 are viewed with suspicion and uncertainty. At best a detailed assessment and prediction of future fishing activities are extremely difficult. With the increasing pressure for food generated by three-quarters of a billion people, more extensive fisheries exploitation can be anticipated. To the extent that increased Chinese fishing extends to waters now fished by nationals of other states, a redistribution of capture will occur. The potential for competition is substantial if not ominous. The extent to which it develops will largely be determined by Chinese will and capacity and the ability of other nations to impose restraints individually or collectively.

Of the six leading producers today, only the United States and Norway failed to increase production during the decade ending in 1965. Some Americans have urgently requested or demanded government action of various sorts for the purpose of restoring and maintaining the earlier competitive rank of the United States.

The FAO Yearbook also reveals the distributional changes which occurred from 1956-65 by groups of species. The only spectacular increase in production occurred in the group of "herrings, sardines, anchovies,etc." Capture of this group climbed slowly from 1956 through 1958, then precipitously to almost 19 million metric tons in 1964. The only decline in the ten-year period came in 1965.

The next most significant increase in capture was registered by two groups of species, "unsorted and unidentified fishes," and "cods, hakes, haddocks, etc." The former climbed steadily from 4.3 million metric tons in 1956 to slightly over 7.0 million in 1964. Production in the latter group climbed every year after 1958 from a low of 4.5 million metric tons to approximately 6.5 in 1965. Other groups registered more modest or insignificant gains.[4]

Previous papers at this Conference have revealed substantial disagreement over future production or potentials for increase. This disagreement relates to both the availability of fish and the economic feasibility of their capture. Two conclusions appear valid. The greatest potential for increase lies in more remote areas and with the smaller fishes with lower value and demand. The amount of increase in production will be determined in part by the amount of government subsidy which will be made available, the cost factor, and the extent to which scarce proteins may be obtained from other sources than the sea. Another Conference paper has warned that exploitation of small fishes must be limited to the extent required to maintain adequate supplies of food fish for larger and more valuable species.

Some species of fish are currently exploited at or below maximum levels of abundance. Increases in capture would probably be temporary with sharp declines to follow. Future distribution of capture by these species would depend upon the stability created by existing regimes and the extent to which additional states will enter these fisheries.

Our topic is limited by the supposition that existing regimes will remain static in number and basic character. Nevertheless, we must qualify any predictions with the certainty that changes in the number and character of regimes will occur. The rate of change will depend upon the speed with which fishing pressure grows, the extent to which particular fisheries are threatened with excessive exploitation, and the extent to which tensions between nations develop. Institutional reform and development will lag behind pressures for change for political reasons and because of bureaucratic inertia.

In a manuscript recently submitted to the University of Washington Law Review, entitled "The Politics of Fisheries; with Special Reference to the 12-Mile Bill," I suggested that the passage of the bill was the culmination of pressures and efforts which date back to the 1880's when Congress attempted to extend fisheries jurisdiction beyond the

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[3] Ibid., p. XXV.

[4] Ibid., p. XXIX.

territorial sea by legislating foreign fishermen out of the North Pacific fur sealery. The sockeye salmon treaty with Canada was finally ratified about thirty-five years after depletion was first recognized, and American states in the Great Lakes region sparred for years over the terms of a much needed treaty with Canada. In spite of this historical record, the pace of institutional development may, and should, accelerate under the twin forces of the population explosion and the technological revolution.

Of all the regimes which have influenced the distribution of fisheries resources in recent years, the regime of the sovereign state has been the most decisive, and it is likely to remain so in the immediate future. Returning to the redistribution which occurred in the decade ending in 1965, particularly with reference to the large volume increases by Peru, the U.S.S.R., Japan, and the Chinese People's Republic, in every instance the governments of these nations were substantially responsible for increased production.

The line between government operations and private enterprise in fisheries industries is sometimes hazy and difficult to determine. In communist and some socialist countries fishing is a government enterprise. Economic plans have established production goals for five-year, seven-year, and, in a general way, for longer periods. The U.S.S.R., for example, has set a 1970 goal at double the 1966 catch. To illustrate: In a Commercial Fisheries Review supplement, November, 1964, Milan A. Kravanja reported that, "Since 1946, well over one billion rubles (U.S. $1.1 billion) have been allocated to the Far East provinces for the expansion of their fishing industry....Most of the capital investments--currently up to about 75 per cent--are spent on vessels....The trend in Soviet Far East fisheries has been toward building more processing and supporting vessels, vital for operating fishing vessels over long periods far from home ports or shore bases." In 1967 it was reported that the U.S.S.R. planned to increase its fishing fleet by 1,500 vessels in the next five years. Data on activities related to fisheries of the Chinese People's Republic are most inadequate. The nature of the system, however, suggests increased involvement and support by government agencies, if not direct operation.

While ostensibly operating more of a free enterprise economy, the Japanese government has contributed significantly in several ways to postwar economic recovery. Fisheries are among the recipients of aid. Detailed information on Peruvian government involvement in fisheries is not immediately at hand. Nevertheless, the phenomenal increase in the Peruvian catch has been aided and abetted in many ways by the government. Lesser advances in fisheries production have also occurred in other nations often with government stimulus, support, or outright control. With increasing population pressures these expansions will undoubtedly continue. New and under-developed states, with pressing needs for economic development, will undoubtedly enter the competition for fisheries resources. Governments in these nations are also heavily involved in their economies. Some observers maintain that Peru overextended her fisheries and that expansion has slowed. China, Japan, and the U.S.S.R. will no doubt continue to expand.

The potential invasion of established fisheries by additional nations appears to be the most volatile of all the problems affecting fisheries. It is also one of the most potent threats to established patterns of distribution. Furthermore, the regime of the sovereign state has in the past and will probably continue in the future to influence distribution by laws, policies, and actions designed to restrict the fishermen of other nations from waters contiguous to their shores to ever-increasing distances. National states have attempted to extend their territorial waters beyond the traditional three-mile limit, and more pertinently for our discussion, have established extended fisheries zones up to and possibly in excess of 200 miles.

The variable impact of state activity on fisheries distribution is illustrated by the proclamations of several Latin American governments, especially Peru. This nation proclaimed an extended exclusive fisheries zone of at least 200 miles and the Peruvian Navy harassed, arrested, and detained United States fishermen and vessels for fishing within this zone. Heavy fines were also imposed. In response the United States has denied the legality of the proclamations but has refrained from giving its fishing fleet physical protection. Nevertheless, the United States government has made some impact on distribution of catch by partial reimbursement of fishermen for losses sustained, thus encouraging continued American fishing.

The principal catch of Peruvian fishermen is anchovetta. Thus far the proclamation enforcement has not resulted in a redistribution of tuna capture from American to Peruvian fishermen. The Peruvian tuna fleet is small and limited to day-time rather than long-range fishing. Distribution is influenced, however, to the extent the American catch is reduced because its vessels are sometimes detained and unable to fish. If Peru and other Latin American states should expand their fishing fleets, proclamation enforcement would no doubt result in a redistribution of catch.

Prior to the Good Neighbor policy of the Franklin D. Roosevelt era and the Cold War, national power was often employed directly or as a threat in order to achieve a variety of objectives unrelated to military conquest. One of the ironies of the present age is the dubious utility of colossal destructive power in the achievement of limited objectives. The United States could no doubt protect its fishermen from seizure and detention by any or all Latin American governments. To do so, however, might cause a setback in the Cold War or the promotion of the Alliance for Progress.

As more nations expand into distant-water fisheries, established extensive, unilateral fisheries zones now in existence may be more frequently and more forcefully challenged. Will the Russians invade these proclamation waters? Will governments attempt to enforce the proclamations against the Russians, the Japanese, or the Red Chinese? How would these nations respond to attempted enforcement?

Expansion of distant-water fishing could be one of the principal causes of redistribution in the future and of conflict between nations. The level of redistribution will be determined by the extent that national power is exercised by some nations and challenged by others. Political considerations may be more decisive than physical strength.

In summary, sovereign states may or may not encourage and support the activities of fishermen in home waters, discourage or physically prevent foreign fishermen from exploiting fisheries in waters beyond their territorial seas,

and may support and protect or ignore distant-water fishermen. What national states do or refrain from doing will probably be the greatest single factor in determining future distribution.

Sovereign states are also the decisive voices in the regimes of the international or world community. They not only determine what international agencies, including fisheries, will be created, but also control substantially or completely the administration of these agencies. The present regime of the United Nations possesses little power over fisheries. However, proposals for increased authority have been urged. The most extensive scheme would transfer title to high seas fisheries and their management to the United Nations in order to eliminate international fisheries conflicts and to provide the United Nations with an independent source of revenue. This authority is not within the scope of "existing regimes" nor is it likely to be for many years. The United Nations does have a Department of Fisheries within the Food and Agriculture Organization. It fulfills important functions in the gathering and tabulation of statistics, and it renders technical assistance to fisheries conferences and in the establishment of international fisheries commissions. However, it holds minor, though recently increased rank, within the United Nations structure. It exercises no compulsive authority nor power to resolve disputes among nations. To the extent that the fisheries program of FAO aids in the stabilization of exploitation of specific fisheries and to the extent that its services stimulate production by particular countries, it will influence future distribution. The total impact by this agency, operating under a parsimonious allocation of funds, is not likely to be significant in the immediate future.

If we may include law in our catalog of regimes, then we must consider the impact of the international law of fisheries on distribution. During the 1940's and early 1950's, fisheries problems were submitted to the United Nations. Their consideration was assigned to the International Law Commission as a part of their study of the law of the sea. In April, 1955, the United Nations convened in Rome a Technical Conference on Living Resources of the Sea. Representatives, primarily fisheries scientists, were sent by forty-five countries and observers by six. The findings of this Conference were submitted to the International Law Commission which in turn modified its earlier proposals and submitted them to governments for response. These proposals and the government responses were the principal background materials for the United Nations Law of the Sea Conference convened at Geneva in February, 1958. The Third Committee--High Seas: Fishing; Conservation of the Living Resources--formulated a convention which ultimately came into effect in March, 1966, on attainment of the twenty-second ratification.

Eighty-six countries sent representatives. The vote on the draft articles included forty-five in favor, one against, and eighteen abstentions. William Herrington, former Special Assistant for Fisheries to the Secretary of State, has described the Geneva Fisheries Convention as "the first to develop an international code respecting fisheries." However, he adds that the convention is not international law in the complete sense since so few ratifications have been received.

The United Nations and the FAO may influence the future distribution of fisheries by encouraging additional ratifications and by convening another world fisheries conference, as proposed by the United States, in order to find more effective means for implementing the Convention and for the development of enforcement measures. The Convention has provided precedents and standards for bilateral and multilateral agreements. However, until it is more universally accepted, its impact upon future distribution will fall far short of its potential.

The International Court of Justice was created to adjudicate international disputes and conflicts of a legal nature. Its jurisdiction, however, is basically limited to those cases where the disputing parties are willing to submit to adjudication. Potentially, the Court could settle fisheries disputes, rendering decisions which could influence distribution. The Geneva Convention of 1958 could become the principal basis for court decisions. However, neither the historical records nor present trends suggest that the Court will soon be burdened with fisheries cases.

At the international level a further type of regime appears, the regime of fisheries treaties and agreements which are both bilateral and multilateral. Some are regional, some cut across regional lines. At the lowest level bilateral arrangements between states include understandings, agreements, and modus vivendi. Without treaty status these agreements extend for limited periods of time, are subject to precipitate termination, are not comprehensive in scope, and often reflect substantial compromise. The fisheries agreement between the United and the U.S.S.R. of February 7, 1967, illustrates this type of agreement. It did not include all of the provisions desired by either party, and included some provisions not desired by either side. There was an apparent reluctance to increase the scope or to establish a long duration. The uncertainties concerning implementation were logical reasons for this limitation in time and scope. The United States obtained more favorable terms than many anticipated. However, since the agreement was limited to one year, the parties may need to reach a new agreement before the expiration date if a return to the problems leading to the agreement are to be avoided. In other words, the agreement represents a temporary step forward and not a final or permanent resolution of United States-Soviet Union fisheries disputes and conflicts.

An intermediate class of agreements includes treaties which may or may not establish an international agency. If they do, the agency is generally limited in authority to research and reporting.

The most sophisticated treaties create formal machinery with policy-making, administrative, and regulatory powers. These agencies have usually been called international fisheries commissions.

The impact of these treaties and agreements on distribution will vary widely. The international fisheries commissions with policy and regulatory authority will exert the most influence. They have modified distribution by increasing fish stocks to or approaching maximum levels of abundance and have stabilized total capture when this level has been achieved. They may or may not stabilize distribution among participating parties. Greatest success has been achieved in bilateral commissions involving the United States and Canada. When the membership increases and the cultural affinity of the participants falls, success falls proportionately.

The utility of the commission approach is potentially high. Nevertheless, the expansion of distant-water fishing by some nations poses a threat to their continued success, if not existence. Japanese fishermen, for example, are allegedly jeopardizing the programs of the halibut and sockeye salmon fisheries as they press their fishing range eastward in the North Pacific. This expansion threatens a redistribution of capture in some areas.

Conceivably, the importance of international commissions to distribution could increase by the creation of new agencies and by the expansion of authority to existing ones. More stability at higher levels of capture should prevail in this event.

Early commissions were impeded by a number of factors such as inadequate authority, inflexibility, underfinancing, the necessity for treaty revision--a slow process--to institute change, the inadequacy of enforcement, and a myriad of minor but frustrating administrative problems. Experience has contributed to the removal of many of the early deficiencies. However, a constant reevaluation of treaty provisions and commission programs is encouraged because of constantly changing technological, political, and economic factors.

In recent decades nations acting unilaterally and collectively have provided technical assistance to underdeveloped countries for fisheries expansion. Lending agencies have provided the means to utilize new skills and equipment. Any increase in production by a new state will have a distributive influence. Potentially, significant redistribution could result. Ironically, an increase of production in aided states could stimulate competition with the aiding state thus lowering their capture both absolutely and relatively. If harmful or destructive competition results, will the current propensity of aiding states to be generous continue? One of the postwar realities of the new and developing states, as well as some of the old, has been the occasional compulsion to "bite the hand that feeds you." In light of this reality, some powers, especially the United States, have exercised amazing patience in continuing to feed the hand that bites them. This is certainly an aberration in the behavior of sovereign states. It might cease with a termination of the Cold War.

Since national behavior, in democracies at least, is sometimes determined by domestic politics, we need to recognize that changing political attitudes may occasionally influence fisheries policy decisions. The ground swell of public opinion in support of national legislation establishing extended fishing zones, the tax revolt, budget cuts in foreign aid encouraged in part by public pressure, are a few of the instances in which public opinion has or may have direct or indirect influence on national fisheries policy and hence upon distribution. The Washington Law Review article mentioned above concludes that for their numbers and the ex-vessel value of fish landed, fisheries lobbies can be unusually vigorous and effective.

Distribution will undergo change in many little ways and some major ones. Following a major invasion in 1965 by large Russian vessels which literally crowded the Oregon trawl fleet off its favorite waters, the 1966 ocean perch catch fell to 30 per cent of the previous year's total. According to the Oregon Fish Commission no other factors than over-fishing by the Russians were apparent. According to Japanese sources, Russian patrol vessels forced Japanese fishermen fifteen miles beyond the Russian twelve-mile zone; and, under the administration of the Northwest Pacific Fisheries Commission, the U.S.S.R. "forced" the Japanese to accept lower salmon quotas. Many other illustrations could be cited. In contrast to total world, regional, and some national production many distributional changes appear small indeed. Nevertheless, the well-being if not the livelihood of many fishermen may be at stake.

Fundamentally, and in summary, we must conclude that the future distribution of fisheries resources will be subject to many fluid forces and to many imponderables which range from local politics to the efficacy of international organizations. We have charted some possible changes, even a few probables. In spite of the increasing need for law, order, and authority in the international community, the sovereign state remains the ultimate force in determining stability or change in distribution. The significance of national sovereignty is most fully revealed in those circumstances where decision approximates the lowest common denominator of what the most uncooperative or the most greedy and aggressive participant is willing to accept.

Hopefully, efforts continue to expand and develop international fisheries law. Growing concern for conservation of resources to feed increasing millions of people has been manifest. The principle of abstention, discussed in previous papers, has been introduced to encourage restraints upon nations. The long range pattern of distribution may well be determined by the balances which are struck between greed and restraint.

EDITOR'S NOTE: Due to programming difficulties this paper was presented on Wednesday afternoon. For discussion on the paper see pages 119-120.

Members of the Panel: Wilbert M. Chapman, Francis T. Christy, Jr., William L. Griffin, James Oswald, and David Stang
Moderator: William T. Burke

Wilbert M. Chapman
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We are presumed to be talking about conflicts over the use of the sea this morning and I assume from the line-up that I am supposed to be talking something about the origin and causes of conflicts in respect of fisheries. We had the benefit of Mr. Wedin's talk the other day and I am sure that when you all get a chance to read that you will find a great deal of interest in it. He pointed up a good many of the causes. One of the greatest and pervading one is sheer competition. It is strong all over the world. Another very important cause is ignorance--ignorance of the size of the resource, its characteristics, the effect of the fishery and the ocean upon it. A third very substantial cause is the need of a nation, or a people, for access to the resource. A fourth is desire and that is, as I will point out, somewhat different. For instance, the United States has no need that I know of for protein of any sort from the ocean but there are some desires. Another source of conflict is differences in capability to fish. And probably the biggest one is plain perversity.

It is quite difficult to determine how all of these things work together and how you can get agreement to avoid conflicts arising out of them. Let us take an instance just before the 1958 conference when, with respect to need, there were two different situations in the world with which the United States had to deal. It had as its allies Japan and Iceland, and needed to accommodate both of those within its viewpoints, both because they were allies and friends and because the United States needed the two votes.

The situation of Iceland was that 99 per cent of its exports were made up of fish; it had to have fish from its waters or it had nothing. It wanted to get rid of the English and everybody else who were catching those fish. So Iceland wanted to settle its problems by eliminating everybody from fishing on the continental shelf or the nearby environs of Iceland. They wanted to not have anybody fishing in the vicinity of their fish stocks except themselves, while at the same time they wanted to preserve a market for the fish amongst the people whom they kicked off the fishing grounds.

The Japanese situation was diametrically different. They also had, at that time anyway, just as bad a need for fish. In 1958 their economy was not quite as flourishing as today. They needed the fish for a variety of reasons--for their own food, for the employment of their people, for the bolstering of their economy. Their need was expressed by the wish to fish everywhere. I think it was approximately the same policy followed for many years by the Van Camp Sea Food Company. Our policy has been clear for many years: all we want with respect to the law of the sea is for our boats to be able to go everywhere and everybody else's boats to stay in harbor.

The difficulty the United States had in 1958 of bridging those two policies of its allies Japan and Iceland and getting both of them and it within one voting structure was so bad that it never happened. I do point those out as two clear examples of very considerable need, and diametrically opposite policies with respect to the law of the sea arising from those needs.

One of the other difficulties associated with need generates fishing problems and that is the need for earning, or preserving, foreign exchange. This is also a quite widespread need, the reason for a great deal of conflict in fisheries and for a great deal of the growth in fisheries. Countries, for instance, I was going to say almost normally and I think that is correct, almost normally subsidize their own fishermen in order to preserve their source of foreign exchange. The examples of this are numerous. At the present time Spain and Italy are growing very rapidly in the fishing business, subsidizing long-range fleets in a large way. This is not because they can't buy fish but they don't want to use the pesos and liras by buying other people's fish. This is a very strong motive behind the push for high seas fishing by not only Russia but the other countries of the Eastern European Socialist bloc--Poland, Rumania, Bulgaria, and East Germany are all expanding their fisheries heavily--and again as one of their large reasons seeking to preserve their foreign exchange situation.

These problems are complicated in the United States position because we have no real desire to preserve our foreign exchange position by catching fish. We spend about $600 million every year buying fish from the outside world and, although our trade deficit is considerable and we talk a great deal about the dangers involved in it, nobody attempts to bolster our fisheries by any of the normal means used by other nations in order to cut down that sort of drain on our foreign exchange balance.

We have the epitome of all the sources of conflict over fisheries within our own fisheries structure, as Mr. Wedin said the other day. We have long-range fishermen who fish off Latin America and get into trouble steadily by doing so, and we have small coastal fisheries, like Mr. Dykstra's fisheries here in New England or like the Northwest fisheries, that are facing very strong competition by fleets of large vessels from far away off their coasts. As a matter of fact, I think foreign fishermen presently are catching about as much fish off the coast of the United States as are United States fishermen. Perhaps not quite so much but in the Pacific at any rate there is well over 1 million tons per year taken by foreign fishermen off the coast of Alaska and now some down off the coasts of Oregon and Washington and California.

We have great difficulty in formulating policy in the United States over these things. Having said a few kind words about the Navy yesterday I will now take the other side and state my belief that the Navy has exercised an extreme myopia in dealing with the law of the sea question in the past twenty years from the standpoint of the

military interests of the United States because of the total inability of the Navy Judge Advocate General's Office to comprehend the nature of the effects of fisheries conflicts on that policy. In 1958 at the Law of the Sea Conference it was typical that the bargaining weapon we had was fish. If there was any way we could give away fish that we had to purchase a vote we would do so, and it was never understood in our delegation that many of our allies simply did not want us to give away their fish. The feeling was quite widespread among allied delegations that they didn't have to worry about the military aspects of this very much; the United States would take care of them if it came down to any great difficulty of a military nature. But they had no faith whatever in the United States taking care of their domestic needs for fish, and I am sure they were quite correct in this. So, our strongest allies on the three mile limit simply refused to vote with us on many of the schemes which were brought out that made sacrifices of their fish for our three mile limit. I will always believe that the move from the three mile limit to the six mile limit in the United States position at that 1958 Conference was the initiation of our defeat on the narrow territorial sea; we picked up a net of about three extra votes by changing from three to six miles in the territorial sea and, regardless of what Mr. Dean and the United States keep saying, the three mile limit went out the window that day.

We have compounded this difficulty year by year since, and last year with the adoption of the twelve mile fisheries limit we lost the narrow territorial sea fight that we put up such a strenuous action for in the 1958 and the 1960 conferences. As somebody read out the other day, I think a little bit conservatively, I think it is now a situation that those nations having a claim of twelve miles are more numerous than nations having more narrow claims. The twelve mile territorial sea fight I think is all over; that battle is done. Now I think we are beginning to try for 200 miles in the United States. Again, I do not think anybody in the Navy understands that fisheries limits cannot be separated from other sorts of territoriality as a practical matter.

In conferences of the nature of the one we have here today we can draw fine distinctions, but once countries get to voting in a conference of plenipotentiaries they do not differentiate so closely as we do in our talks. I think you wanted to stir a little controversy this morning and you gave me eight minutes. I have now used nine and so I will stop.

Francis T. Christy, Jr.
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I have a clipping of an advertisement that I took out of a fishing magazine recently. It says, "Hundreds of transatlantic telephone calls cut off. Your trawl doors could cause this." There is a picture of a mass of cables and a worm-like structure, "Trawler captains, please help solve this undersea problem, avoid fishing over our cables. It means damage to your equipment as well as to our telephone cables. We have free Decca charts for you showing the location of our cables off Newfoundland and in Cabot Strait. We welcome any suggestions you may have for the protection of your equipment and ours. Write to John Stevens, American Telephone and Telegraph Company." This I think is an indication of the kinds of conflicts in the uses of the sea that are going to become more and more prevalent. Conflicts such as those that might emerge when oil rigs prevent the efficient sweep of fishery vessels in fishing grounds, or such as the 2,000 offshore rigs in the Gulf of Mexico which already create difficulties for navigation. Conflicts such as pollution and its manifold aspects with respect to recreational, commercial, and sports fisheries. And as our seas become more and more crowded the nature and severity of these conflicts will become more severe. Somehow or other these conflicts will have to be resolved and it is to be hoped that the resolutions will be beneficial and just.

The complexities are inordinate and simply to speculate about some of them boggles the mind. But I do not think that we can afford to let the complexities deter us from seeking rational solutions. I would like to say that economics can provide the answers but I don't think that even that could be true. It seems to me that there are two different requirements that must be met. The first is to provide the vehicle (the regime or sets of regimes) that can best deal with the conflict. And the second is to work out the criteria that can be used in reaching the resolution.

There are three kinds of marine conflicts that might be distinguished. The first includes those conflicts that fall entirely or almost entirely within a single national jurisdiction. The conflicting use of estuaries, for example, for navigation, recreation, landfill, waste disposal, is an indication of the kinds of conflict within national jurisdictions; although even here there may be external effects felt in international waters. The second kind of conflict occurs when the use of a resource within a national jurisdiction impedes the use and enjoyment of a resource within international waters; as, for example, where oil rigs on a coastal state's continental shelf prevent efficient commercial trawling or impose costs to a cargo vessel by making it proceed at a slower rate or travel a greater distance. And a third set of conflicts occur purely within international waters ; as, for example, between fishing and transport vessels on the high seas.

Insofar as the problems are contained within a national jurisdiction they are of no interest to this conference although they are vastly complex. But the two other kinds of conflict call for attention by the Law of the Sea Institute. As a basis for discussion, let me speculate about one possible kind of conflict. The possibility of developing oil wells on the Grand Banks off the coast of Newfoundland has already attracted exploration. The oil resources of the Banks are within the jurisdiction of Canada, or of France. (It turns out, I heard recently, that the same plot of ground off the islands of St. Pierre and Miquelon, French islands off Newfoundland, has been leased to two different oil companies. One lease was let by the French and the other lease let by the Canadians. This is an interesting case but it is not really pertinent to our discussion this morning.) So let us assume that the Banks are indeed Canadian and as exploration develops the conflicts with fishermen will emerge, possibly through the use of explosive soundings and definitely through the construction of rigs fixed to the bottom. Initially the costs to fishermen may not be very great but eventually they are likely to become severe. What then will happen? Who will speak for the fishermen of the fourteen or fifteen different nations and present their case to the Canadian government? Will this be done by the individual nations whose fishermen have borne direct costs through collision or net damage? Or will this be done through the medium of ICNAF--the International Commission on the Northwest Atlantic Fisheries? And if through the latter, what kinds of authority would ICNAF have to have in order to deal with a sovereign state such as Canada? Or, if not ICNAF, what other form of agency, perhaps more comprehensive in scope, could be developed to resolve these kinds of difficulties? And what role would the International Court of Justice have? These are obviously difficult questions but even worse are those relating to the second requirement, the criteria to be used in resolving the conflicts under whatever regime or sets of regimes are operative.

The Geneva Convention on the Continental Shelf states that the development of shelf resources: "Must not result in any unjustifiable interference with navigation, fishing, or the conservation of the living resources of the sea." But this is hardly a satisfactory guide for decision-making. What constitutes "unjustifiable" interference? Economic analysis could and should be brought to bear on the problem insofar as it can. But how can one evaluate the worth of oil to Canada against the worth of fish to the Soviet Union or West Germany? There may be ways of approaching this by assuming world markets for both the inputs and the outputs but this would be a surrogate measure at best. Other criteria may also be suggested but in each case the difficulties appear to be overwhelming. Be that as it may we cannot avoid facing these difficulties and we must begin to extend our research and discussion.

ACCOMMODATION OF CONFLICTING USES OF OCEAN SPACE WITH SPECIAL REFERENCE TO NAVIGATION SAFETY LANES*

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Introduction

For centuries the predominant picture of ocean space activity has been fishing and navigation for transportation and military sea power. These ocean space activities are primarily utilization of the water as an instrumentality.

Scientific and technological strides of the past decade have produced a new picture of ocean space activity. It has become increasingly clear that man has the ability to occupy ocean space. Political and economic incentives make certain that man will occupy ocean space. The last few years have yielded major advances, both conceptual and practical, toward the accomplishment of this task. The outlines of human requirements and capabilities underwater are becoming increasingly clear, as are the dimensions of the still unsolved problems. To a large extent a period of vision and conjecture is ending. Man now faces a period of intensive research, development, application and evaluation of ocean space activity as an extension of his multi-purpose dry land activity. Viewed from this perspective, the water of ocean space is simply an environmental factor which must be reckoned with in order to achieve the desired goals. Hence the newly drawn perspective of political, social, economic and legal interests and attitudes regarding ocean space has a water environment orientation.

From the overlay of the new picture of ocean space activity upon the old there are now appearing the broad outlines of a montage of the utilization of total ocean--water surface, water column, seabed and subsoil--for a broad spectrum of diverse and often conflicting uses by transportation, fishing, industrial and scientific interests.

In this montage of total ocean space activity the convergence of water environment and water instrumentality orientations intensifies the disparateness of political, social, economic and legal interests and attitudes regarding both jurisdiction in, and the uses of, ocean space. The matter of uses may in turn be divided into two categories: (1) the problems peculiarly relating directly to each particular type of use and (2) the problems of accommodating conflicting uses.

This paper is confined to focusing upon the latter--the shared use of ocean space by transportation and industrial interests. Nevertheless, this paper should be read with one eye on the unity of ideas inherent in the conceptual and functional links between matters of jurisdiction, separate uses and conflict of uses despite the emphasis herein on the latter as against the former two for purposes of analysis and discussion.

Identifying the Conflicts

Conflicts in the use of ocean space can take a variety of forms. The most obvious generality is that two things cannot occupy the same space at the same time. The principal risk at sea today arises from collision between ships. The magnitude of this problem is probably not appreciated outside of shipping circles.

The increase in the number of ships (world seaborne trade has nearly doubled in the last ten years), the greater average speed of ships and the high accuracy of modern position-fixing devices combine to produce convergence areas of high traffic density.

High traffic density occurs:

a. Where ships have to make a course alteration to round a headland and are likely to keep the same distance offshore.

b. Where traffic is confined to a narrow strait, e.g., the Straits of Dover through which pass about 750 ships per day.

c. In the approaches to large ports, e.g., New York where about 70 ships per day enter or depart.

A more recent and still increasing form of spatial conflict is between ships and stationary objects such as oil installations, the outstanding example being the Gulf of Mexico.

Oil production activities in the Gulf of Mexico began substantially in 1947. By 1965 there were about 5,000 oil installations, of which 2,000 were in or near shipping areas out to fifty miles from shore. From 1951 to 1965 the number of ships in foreign trade entering and departing Gulf ports increased by about 2,000 ships. There have been about fifty collisions of ships with installations.

The foregoing spatial conflict situations contain a factual distinction which is relevant to the accommodation problem: The traffic density problem involves conflict between users of the same ocean space for the same type of use. The shipping and shelf installation problem involves conflict between users of the same ocean space for different types of use.

*The views expressed herein are those of the author and are not to be attributed to the U.S. government or any Agency thereof.

There is also another, less immediately obvious, non-spatial type of conflict between shipping and shelf installations. An installation may be located outside of, but in such proximity to, a shipping lane as to cause interference with navigation. Thus, off the port of Galveston a ship lost thirty-seven hours anchored in fog because the ship's radar could not differentiate between the sea buoys leading into the port and nearby oil installations. Also, off the port of New Orleans ships could not locate the key sea buoy marking the channel entrance because it was hidden by an oil installation.

For factually descriptive purposes, it seems convenient to summarize these three types of conflicts as:

1. Conflict involving the same transitory use of the same space.

2. Conflict between different uses of the same space.

3. Conflict between different uses of different space.

General Nature of the Accommodation Problem

It takes but a moment's reflection to come to the conclusion that the nature of the accommodation problem is different in kind as between conflicts involving the same use--in particular the traffic density problem--on one hand and conflicts between different uses--in particular the shipping and shelf exploitation problem--on the other hand.

The scope and nature of the traffic density problem is fairly well developed in the existing Rules of the Road. It does not involve choosing between different uses; it involves what further refinements can be developed to ease traffic congestion.

But the scope and nature of the shared use of ocean space by different and conflicting uses is not yet adequately developed in general principles of modern international law either customary or conventional.

Article 1 of the Convention on the High Seas, adopted "as generally declaratory of established principles of international law" says that the uses, or freedoms of the high seas

> "which are recognized by the general principles of international law, shall be exercised by all States with reasonable regard to the interests of other States in their exercise of the freedom of the high seas." (Underscoring added.)

Article 5(1) of the Convention on the Continental Shelf, adopted as "progressive development" of international law, goes beyond the rule of reasonableness, at least textually, and adopts a rule of "unjustifiable interference," in these words:

> "The exploration of the continental shelf and the exploitation of its natural resources must not result in any unjustifiable interference with navigation, fishing or the conservation of the living resources of the sea." (Underscoring added.)

The concept of "reasonable regard to the interest of others" appears to be synonymous with the concept of "unjustifiable interference." The latter seems preferable because it expressly recognizes that some conflict between uses is inevitable and pinpoints the exact nature of the problem as being the determination of when and what interference is justifiable.

The concept of unjustifiable interference seeks an accommodation of conflicting uses so that all uses may be maximized. In most situations an absolute choice between conflicting uses will most likely not be necessary. But application of the concept of unjustifiable interference requires interpretations and extrapolations concerning factual situations which will vary widely and more guidance is needed than is contained in the phrase "unjustifiable interference." This raises the closely related matters of priority among uses and the factors to be considered in determining unjustifiable interference.

Priority Between Navigation and Shelf Exploitation

As already noted above, Article 5(1) of the Convention on the Continental Shelf says that shelf uses must not result in unjustifiable interference with navigation.

Article 5(2) says that the coastal states shelf exploitation installations are "subject to" Article 5(1) and Article 5(6).

Laying aside Article 5(6) momentarily, Article 5(1) and (2), taken literally, seem open to the interpretation that there is a presumption in favor of navigation (also fishing and conservation) in gross over shelf installations in gross and that therefore it would not be relevant to inquire whether navigation in a particular place might result in unjustifiable interference with shelf installations. This interpretation seems not to be supported by the following ILC Commentary on its final draft Article 71, which was the nucleus of Article 5:

> "...The progressive development of international law, which takes place against the background of established rules, must often result in the modification of those rules by reference to new interests or needs. The extent of that modification must be determined by the relative importance of the needs and interests involved. To lay down, therefore, that the exploration and exploitation of the continental shelf must never result in any interference with navigation and fishing might result in many cases in

> rendering somewhat nominal both the sovereign rights of exploration and exploitation and the very purpose of the articles as adopted. The case is clearly one of assessment of the relative importance of the interests involved....in the first instance, the coastal State must be the judge of the reasonableness--or the justification--of the measures adopted...."[1]

The history of Article 5(6) throws more specific light on the ILC's view that accommodation of navigation and shelf uses involves a reciprocal assessment of their relative importance. Article 5(6) provides that shelf installations (and their safety zones) may not be located "where interference may be caused to the use of recognised sea lanes essential to international navigation."

Article 5(6) had no counterpart in the 1951 ILC draft on the continental shelf, which simply said (Art. 6) that shelf uses "must not result in substantial interference with navigation or fishing." The ILC commented that:

> "1...Navigation and fishing must be considered as primary interests, so that the exploitation of the subsoil could not be permitted if it resulted in substantial interference with them. For example, in narrow channels essential for navigation, the claims of navigation should have priority over those of exploitation."[2]

In reference to the foregoing, the ILC's Special Rapporteur, Francois, in his Fourth Report on the Regime of the High Seas: The Continental Shelf and Related Subjects[3] commented:

> "Young considers that in this article the Commission failed to show the same far-sightedness which marked its approach in article 1. It would seem that the question whether navigation or fishing or the exploitation of natural resources is the chief interest in any particular area is a question of fact, a that priority of right ought to be determined accordingly. In many areas of sh low waters, off the beaten track but rich in resources, navigation may be of no real importance; it would seem absurd to impose elaborate restrictions on development of the resources to protect a "primary interest" amounting to a few small craft a year. Conversely, one may well wish to avoid development installations in the midst of a busy seaway.'
>
> "To meet Young's objections, which are shared by Mouton, the Rapporteur proposes that the last two sentences in paragraph (1) should be modified to read as follows: 'Navigation and fishing must always be considered as primary interests of all mankind. The construction of installations which hampered navigation or fishing can be justified only where they fulfill an equivalent interest; hence in narrow channels essential to navigation any exploitation which substantially interfered with a considerable volume of shipping could not be permitted.'"

The ILC at its fifth session (1953) reconsidered Article 6 of its 1951 draft in the light of the comments of governments and Francois' Fourth Report.[4] Mr. Kozhevnikov said that a number of governments felt that more stress should be laid upon navigation and fishing. He accordingly proposed as a new paragraph of Article 6 that:

> "(3) Neither the installations themselves, nor the said safety zones around them, shall be situated in straits, narrow channels or on recognized sea lanes."

Mr. Lauterpacht said that large scale installations might justify substantial interference with navigation. In such cases the interference, though substantial, would not be unreasonable. Mr. Sandstrom felt that navigation and fishing should be given equal priority with exploitation. Mr. Francois considered that navigation and fishing would have to yield sometimes to larger interests of new industry. He doubted the justification for prohibiting installations in straits or recognized sea lanes in the case of an industry which might be of the greatest importance to the community. It is a question of balance of interests. Mr. Cordova said it was a highly technical matter to determine which interests were overriding and it would be impossible for the Commission to devise a comprehensive provision. Mr. Lauterpacht said it would not be desirable to establish too rigid a text determining which interests should prevail. It would be going too far to prohibit rigidly installations on sea routes. Mr. Kozhevnikov's text would make installations unlawful in many sea areas and straits which are used for navigation solely because convenient. Mr. Francois suggested adding to Mr. Kozhevnikov's text the phrase "essential to international navigation." Several members objected to including the term "straits." In wide straits installations could be erected without hampering navigation; narrower straits were covered by the other terms.

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[1] II Yrbk. of ILC, 1956, p. 299.

[2] II Yrbk. of ILC, 1951, p. 142.

[3] U.N. Doc. A/CN.4/60, 19 Feb. 1953, pp. 111-12.

[4] I Yrbk. of ILC, 1953, pp. 102-9.

Ultimately the ILC adopted the following new paragraph and commentary regarding sea lanes:

"5. Neither the installations themselves, nor the said safety zones around them may be established in narrow channels or on recognised sea lanes essential to international navigation."[5]

"80. While generally the Commission, by formulating the test of unjustifiable interference, thought it advisable to eliminate any semblance of rigidity in adapting the existing principle of the freedom of the sea to what is an essentially novel situation, it thought it desirable to rule out expressly any right of interference with navigation in certain areas of the sea. These areas are defined in paragraph 5 of article 6 as narrow channels or recognised sea lanes essential to international navigation. They are understood to include straits in the ordinary sense of the word. The importance of these areas for the purpose of international navigation is such as to preclude, in conformity with the tests of equivalence and relative importance of the interests involved, the construction therein of installations or the maintenance of safety zones even if such installations or zones are necessary for the exploration or exploitation of the continental shelf."[6]

At the 1958 Geneva Conference the phrase "in narrow channels or" was deleted by Committee IV to make the sea lane paragraph more concise by removing this phrase which appeared to be unnecessary.[7]

From the foregoing legislative history two conclusions stand out:

1. In the derivation of Article 5 of the Convention on the Continental Shelf no presumption was involved in favor of any particular use in gross, e.g., navigation over shelf exploitation; unjustifiable interference involves a two-way assessment of interests and needs.

2. Paragraph 6 of Article 5 is itself only the result of an assessment that in "sea lanes essential to international navigation" the interests and needs of navigation outweigh those of shelf exploitation.

Factors in Determining Unjustifiable Interference

Both the legal and factual aspects of accommodation of conflicting uses of ocean space are a close analogue to the accommodation of conflicting uses of international rivers, e.g., irrigation versus power, navigation versus diversion, and upstream uses versus prior downstream uses.

In both cases new uses come forward to compete with older uses which have acquired an aura of sanctity from long established usage and which have gathered about themselves the protection of a body of established legal rules. In both cases if the newer uses are not to be stifled at birth there must be some modification of the older uses and their rights. Conversely, if the older uses are not to be wiped out the newer uses and their rights must be circumscribed. Both cases involve the assessment of the relative importance of the needs and interests involved when all relevant factors are taken into account.

In the case of international rivers the accommodation problem is often dealt with under the rubric "equitable apportionment" instead of unjustifiable interference. There is a wealth of international experience and literature concerning this concept of equitable apportionment and the factors relevant to its determination which has been summarized by the present writer[8] as follows:

"2. (a) Riparians are entitled to share in the use and benefits of a system of international waters on a just and reasonable basis.

(b) In determining what is just and reasonable account is to be taken of rights arising out of:

(1) agreements
(2) judgments and awards, and
(3) established lawful and beneficial uses; and of other considerations, such as

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[5] II Yrbk. of ILC, 1953, p. 213; II Yrbk. of ILC, 1956, p. 299, Art. 71(5).

[6] II Yrbk. of ILC, 1953, p. 216; II Yrbk. of ILC, 1956, p. 300, para. (7).

[7] VI U.N. Conference on Law of the Sea, Fourth Cmte., p. 83.

[8] W. L. Griffin, "Use of Waters of International Drainage Basins Under Customary International Law," 53 Am. J. Int. Law 78 (1959).

(4) the development of the system that has already taken place and the possible future development, in the light of what is a reasonable use of the water by each riparian,
(5) the extent of the dependence of each riparian upon the waters in question, and
(6) comparison of the economic and social gains accruing, from the various possible uses of the waters in question, to each riparian and to the entire area dependent upon the waters in question.

"COMMENT: The foregoing is an attempt to formulate the factors which would be considered in applying the doctrine of 'equitable apportionment of benefits' because, whatever the situation--whether in negotiation or before a tribunal--more guidance is needed than is contained in that phrase. Other factors could doubtless be included.

" Perhaps an additional factor would be that the order of priority of uses of a particular system would be the relative importance of the possible different uses to the international area served by the system. It is doubtful that a statement of priority among uses of water for all systems could be made as a matter of existing law. On some systems the navigational use is of paramount importance; on others irrigation would surely come next after drinking and domestic uses.

" It is believed that existing law gives priority to factors 1-3 in the order named, but not to other factors. Even so, it may be difficult to balance the various factors because they would have different weights in different situations. For example, one riparian may have delayed developing uses of another riparian. On the one hand, the latter should not have its investment impaired by subsequent uses by the former; on the other hand, the former should not be deprived of the opportunity for its own development...."

Using the above outline as a pattern, a statement of general principles for giving content to the concept of unjustifiable interference might be formulated as follows:

(A) Every international organization, state or person not prohibited by his own government is entitled to engage in any lawful use of ocean space on a just and reasonable basis.

(B) In determining what is just and reasonable account is to be taken of:
(1) Rights arising out of
(a) agreements
(b) judgments and arbitral awards, and
(2) Other considerations, such as
(c) established lawful uses in a given place
(d) the relative economic importance of conflicting uses to the parties concerned
(e) the economic effect on the parties of any change in use
(f) the availability of suitable alternative locations for a particular use
(g) the availability of suitable alternative techniques for accomplishing the objectives of a particular use
(h) the long-range benefits or detriments resulting from a particular solution

It must be recognized that it may not be possible to evolve general principles beyond broad statements such as the foregoing. The nature of user needs and interests varies in different ocean areas. Navigation has a greater significance for some areas, fishing for others, minerals production for still others and so on in a great variety of situations that are already quite well known. Other such future situations can now be only dimly perceived. Under these conditions the search for doctrinal unities is a very difficult one. It is likely that there will be an increasing use of multilateral and occasionally bilateral agreements to deal with the very special technical problems arising from various user claims made upon particular ocean areas. An agreement can say with a great deal of particularity what customary law cannot say.

One such special technical problem presently receiving increasing attention is the designation of sea lanes in selected areas.

The Sea Lane Concept

There is a similarity between traffic at sea and traffic in the air and on the road. Air and road traffic have long been required to operate in specified lanes because neither aircraft or road vehicles could otherwise safely proceed.

Specified lanes for marine traffic have not been commonplace because generally conditions have not called for them and perhaps also because of mariners' insistence upon their time-honored right of freedom of the seas. However, the idea of marine traffic lanes is over a century old. More than a century ago, Lt. Matthew Maury, USN, proposed separate lanes for steamers in the North Atlantic. His idea was the forerunner of the current North Atlantic Track Agreement, involving as parties only sixteen shipping companies flying six different flags. The use of these lanes by the Andrea

Doros and the Stockholm would have prevented their collision.

Separate lanes have been very effective on the Great Lakes. In 1911 the Lake Carriers' Association established separate upbound and downbound courses for their members' ships on Lakes Superior and Huron. They were extended to Lake Michigan in 1926, to Lake Erie in 1947, and to Lake Ontario in 1949. It should be noted that this action was taken voluntarily by the industry in the interest of safety, without the need of legislative action or support. The courts have held that it is negligent navigation to leave the lanes without reason. Coast Guard Marine Boards of Investigation have cited vessels' failure to adhere to them as a contributing cause of collisions.

The matter of sea lanes for ocean navigation falls naturally into two divisions: (1) Traffic separation lanes for vessels and (2) Fairways through continental shelf installations.

(1) Sea-Traffic Separation Lanes: During the past few years the need for sea-traffic separation lanes in congested areas has received increasing attention.

The 1960 Convention on the Safety of Life at Sea, which came into force in 1965, provides in Chapter V, Regulation 8:

> "(a) The practice of following recognized routes across the North Atlantic in both directions and, in particular, routes in converging areas of both sides of the North Atlantic, has contributed to the avoidance of collisions between ships and with icebergs, and should be recommended to all ships concerned.
>
> "(b) The selection of the routes and the initiation of action with regard to them, and the delineation of what constitutes converging areas, is left to the responsibility of the shipping companies concerned. The Contracting Governments will assist the companies, when requested to do so, by placing at their disposal any information bearing on the routes which may be in the possession of the Governments.
>
> "(c) The Contracting Governments undertake to impose on the companies the obligations to give public notice of the regular routes which they propose their ships should follow, and of any changes made in these routes. They will also use their influence to induce the owners of all ships crossing the Atlantic bound to or from ports of the United States or Canada via the vicinity of the Grand Banks of Newfoundland to avoid, as far as practicable, the fishing banks of Newfoundland north of latitude 43° N. during the fishing season, and to pass outside regions known or believed to be endangered by ice."

In 1961 the Institutes of Navigation of Great Britain, France, and West Germany formed a Working Group to study traffic regulation at sea with particular reference to Dover Strait, where 300,000 ships pass each year through a channel five miles wide.

Any proposal for sea lanes cuts across the time-honored freedom of Masters to select their own routes on the high seas. Departure from this principle might mean that ships would have to make longer trips and suffer loss of time to comply with traffic routing measures. On the other hand, there is little value in a freedom which is rendered academic by a traffic density which makes safe navigation virtually impossible. Moreover, sea lanes can be so formulated that increased distance is short and offset by time saved through traffic-flow improvement.

Sensitive to the foregoing pros and cons, the Working Group circulated a questionnaire to 10,000 Masters. Of 3,700 replies received, 95 per cent were in favor of sea lanes in the Dover Straits.

The Working Group's report in 1962 recommended that through traffic be advised to follow certain recommended tracks. Such lanes would not be compulsory because some circumstances might make them impracticable. Nor could ships in recommended lanes claim priority over other ships. In time the observance of the lanes would become the Ordinary Practice of Seamen and thus subject to the Collision Regulations, which remain the only rules governing maneuver. A ship involved in a collision through disregarding a recommended route might have to explain how it came to do so, but this does not necessarily mean that it would be found at fault.

The Group's report was forwarded to the Maritime Safety Committee of the Intergovernmental Maritime Consultative Organization. The Committee accepted the recommendations in 1964 and it was agreed that all member states of IMCO should advise their ships to use the lanes.

In 1964 the same Institutes of Navigation formed a new Working Group to study sea lanes for other congested European converging areas where traffic separation could lead to the reduction of collisions. The Group's membership includes representatives of carriers in the United Kingdom, France, West Germany, the Netherlands, Norway, and the United States, oil interests, governments, and observers from IMCO, Lloyd's, and the International Chamber of Shipping.

The Group's report in 1966 concludes that the most effective and simple method of traffic separation is the establishment of offshore safety zones near points of convergence. These zones would generally be two miles wide and twelve miles long, parallel to the main flow of traffic, which is to keep them to port. The Group's report recommends separation safety zones in the following areas: Baltic, North Sea, Dover Strait Coastal areas, and the English Channel to Gibraltar.

The North Sea proposal is of interest because of the oil rig problem. In essence it provides for the ultimate division of the main North Sea traffic into two lanes three miles wide separated by a two-mile-wide safety zone and a somewhat complex plan for traffic separation in the approaches to the Jade/Weser and Elbe.

The Group's report has been submitted to IMCO for consideration by its Maritime Safety Committee. Much work remains to be done in seeing to fruition the studies of the two Working Groups and in other matters such as maintaining contact with oil interests regarding the placing of oil rigs and similar installations. To do this a permanent international body is now being formed.[9]

Collisions off the Atlantic and Pacific coasts of the United States have raised the desirability of traffic separation lanes at the approaches of the larger United States ports. Committees to study sea lanes for New York and Philadelphia were appointed by the Coast Guard in 1965. The committees included representatives of the Coast Guard, Corps of Engineers, Coast and Geodetic Survey, American Merchant Marine Institute, and local marine groups such as the Sandy Hook Pilots. Similar study groups are to be convened under the District Coast Guard Commanders at Boston, Norfolk and Miami with a view of possible establishment of sea lanes for congested port areas within those districts. Such a study has been concluded for San Francisco; other West Coast ports are under consideration.

In January, 1967, the Coast Guard announced implementation of the recommendations of the New York and Philadelphia committees for the establishment of traffic separation lanes for those ports. The New York sea lane system consists of three sets of shipping lanes leading to and from the entrance to New York Harbor. Each set of lanes has one inward and one outward bound lane separated by a safety buffer zone. The lanes fan out from the circumference of a seven-mile radius circle established around the Ambrose Light Station at the entrance to New York Harbor. One set, for use of North Atlantic traffic, extends due east to Nantucket Lightship; a second set southeasterly for South America, Africa and West Indies trade; and a third set due south, for Atlantic coastal shipping. The inward and outward bound lanes of each set taper from a maximum width of five miles to a minimum of one mile at the Ambrose Light circle. The safety zones taper from three miles width to one mile width over the same distance (see Figure 1). The New York sea lanes have been printed on Coast and Geodetic Survey charts 1215 and 1108.

Two similar sets of traffic separation lanes lead to the entrance of Delaware Bay (see Figure 1, inset). These lanes have been printed on Coast and Geodetic chart 1219.

The following note is printed in the margin of the charts:

> " SEA LANES
>
> The sea lanes overprinted on this chart are RECOMMENDED for use by all vessels travelling between the points involved. They have been designed to aid in the prevention of collisions at the approaches to major harbors, but are not intended in any way to supersede or alter the applicable rules of the road. Buffer zones are intended to separate sea lanes and to be free of ship traffic, and should not be used except for crossing purposes. When crossing sea lanes and buffer zones, use extreme caution."

(2) Fairways through Gulf of Mexico Oilfields: In the early days of oil exploration in the Gulf in the late 1940's no one could know where wells would ultimately be established or how extensive they would be. The existence and extent of oil reservoirs could become known only gradually through exploration and development over the years. However, it soon became clear to the shipping industry that in order to prevent undue interference with navigation, shipping lanes would have to be preserved through the rapidly expanding Gulf oil fields. It took the problem to the Army Corps of Engineers because of the Corp's responsibility for the licensing of obstructions to navigation in the territorial sea. The Corps of Engineers, in consultation with other interested governmental agencies and the oil industry, agreed that installations should not be allowed in agreed-upon lanes and anchorages. In 1953 the Outer Continental Shelf Lands Act extended the Corp's authority in this regard beyond the territorial sea. In 1954 the sea lane--or fairways--program was begun.

From the very beginning of the fairways program there was complete cooperation between the shipping industry, the oil industry and government in locating and relocating the fairways. The fairways program in its early years was conceived of as primarily a defensive measure. Shipping would not necessarily use the fairways exclusively. It was understood between the oil and shipping industries that if no oil was found alongside a fairway and it was desired to drill in a fairway, the shipping industry would be amenable to shifting the fairway. There was no thought of charting the fairways.

By the early 1960's, it had become clear that merely reserving the fairways space, charting the oil installations and publishing their location in the "Notice to Mariners" was not sufficient. Although fairways had been in existence since 1954, some mariners tended to disregard them, perhaps sometimes through reluctance to alter time-honored routes; but more often because of unawareness of their location. Instances of collision, near-collision and navigation delays continued to multiply. Maximum benefits from the fairways could only be achieved by marking them on the charts actually used by mariners.

In mid-1962 the Corps of Engineers proposed to the interested governmental agencies that the fairways and anchorages be shown on the nautical charts prepared and issued by the Coast and Geodetic Survey.

In April, 1963, a conference of federal and state government officials in New Orleans gave further consideration to the problems attendant upon charting the fairways; it was decided the time had come to call a conference to obtain the views of the shipping and oil industries.

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[9] This information is largely based on M. W. Richey, "The Separation of Traffic at Sea," 19 Journal of the Institute of Navigation (Great Britain) (October, 1966), pp. 411-35.

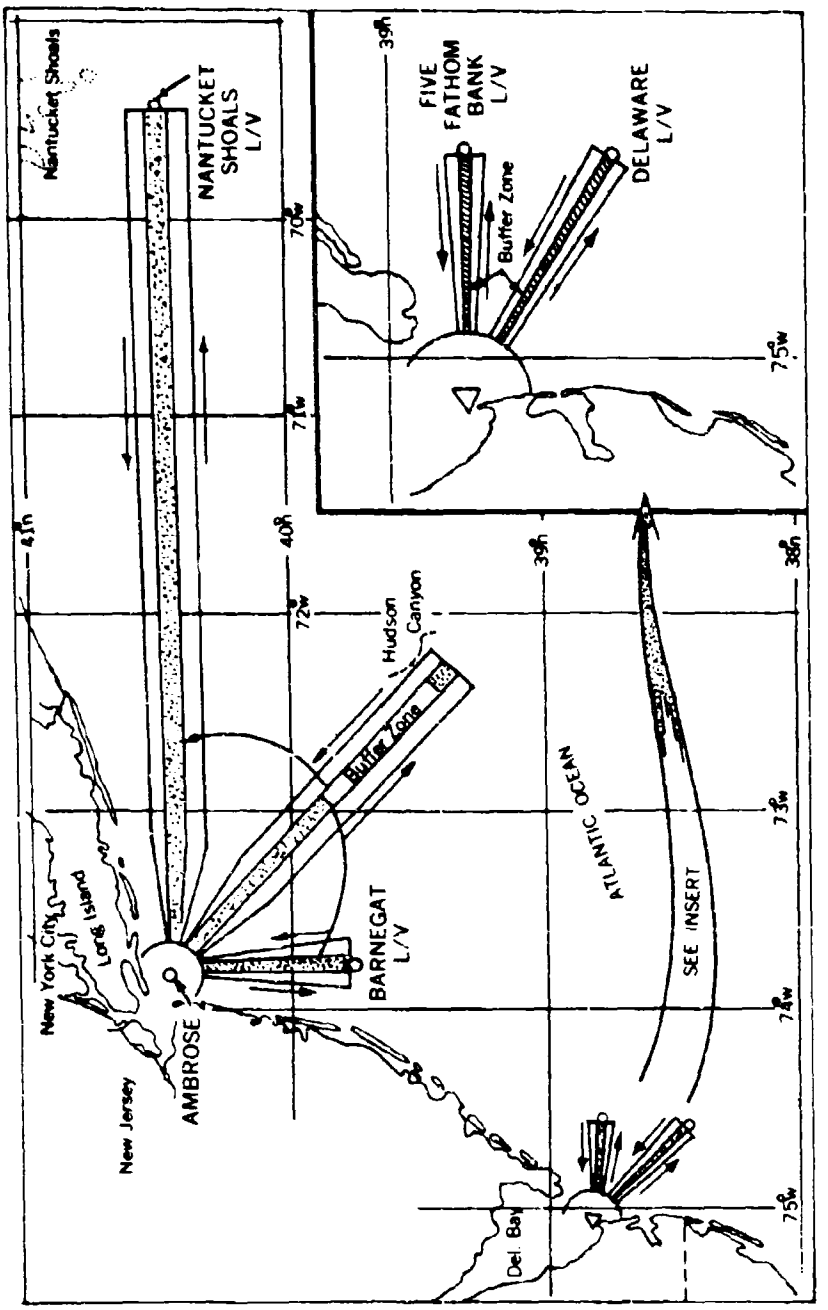


FIG. 1: SEA LANES FOR VESSEL TRAFFIC CONTROL

The conference was held in June, 1963 at the headquarters of the Army Engineers District in New Orleans. Its purpose was to determine what could be done by federal and state government agencies to foster safe navigation and at the same time promote optimum development of natural resources of the continental shelf. There was a complete and unrestrained exchange of ideas regarding these conflicting objectives, with particular reference to aids to navigation, use of fairways, location of fairways, width of fairways, length of fairways, marking of fairways, permanence of fairways and the need and means of charting fairways.

The conference of June, 1963 revealed a significant shift in the attitude of the shipping industry regarding the establishment and use of the fairways. When oil installations first began to appear in the Gulf, the shipping industry had wanted the fairways primarily as a defensive measure. Ten years later, the shipping industry had come to the position that in the interest of safe navigation the fairways must be designated as permanent, must be marked and charted, and that if this were done mariners would use them voluntarily. The oil industry recognized the need for fairways for protection of oil installations as well as ships, and was in favor of their being marked and charted but was opposed to the concept of permanency of the fairways if this meant they were to be immutable.

The matter of permanency of the fairways, upon examination, proved to be more academic than real. From the very beginning there had been complete cooperation between shipping and oil interests in the locating and relocating of the fairways. They had tended to become substantially permanent in fact because over a ten-year period there had been need for only two or three changes, which had been readily agreed upon. The consensus of the meeting of June, 1963 was that the fairways and anchorages would remain in principle subject to modification but only after due notification and consideration of the views of all interested parties.

Consensus was also readily achieved upon the next most important matter, that of the width of the fairways. From the navigator's viewpoint, the desirable width of a fairway is related in some degree to the type and completeness of the channel marking and aids to navigation. In general, a two-mile wide fairway is adequate. From the oil producer's viewpoint, the desirable width of a fairway is related in some degree to the technological capability of directional drilling for different objective depths and purposes; the greater the width of a fairway the greater is the financial burden of developing the resources. A fairway width of more than two miles substantially eliminates the availability of any underlying resources. Once a fairway is established, it is easier to try directional drilling than it is to move the fairway.

With regard to the length and marking of fairways, consensus was readily achieved that each fairway must be considered separately because each presents its own particular problem, the factors being the draft of ships, the amount of traffic involved, the degree of congestion of the installations and the seaward limits of oil activity.

Finally, it was felt that it would be unnecessary and undesirable to attempt to require that ships must use the fairways. In bad weather it might be impossible to keep a ship within a fairway. If the safety of the ship was involved, it might be undesirable to keep a ship within a fairway. This should be within the Master's judgment depending upon the circumstances. The consensus was that if the fairways were charted prudent mariners would normally use them. In the event of a collision outside a fairway it is likely the courts and the Coast Guard Marine Boards of Investigation will recognize the fairways as they have recognized the concept of shipping lanes on the Great Lakes.

By November, 1965, the final administrative details were worked out for formalizing, publicizing and charting the fairways and anchorage areas at entrances to ports. The fairways are known officially as "Shipping Safety Fairways and Anchorage Areas, Gulf of Mexico." The fairways and anchorages are shown on nautical charts prepared by the Coast and Geodetic Survey. The overall area covered by the charts extends from Charlotte Harbor on the Florida Gulf Coast to Brazos Santiago on the Texas coast near the Mexican border. The first charts to show the fairways and anchorages (C&GS Nautical Charts 1115 and 1116) were issued in January, 1966, (see Figure 2) and cover the Gulf coast from Port St. Joe, Florida, to Galveston, Texas.

The charts have this explanatory note:

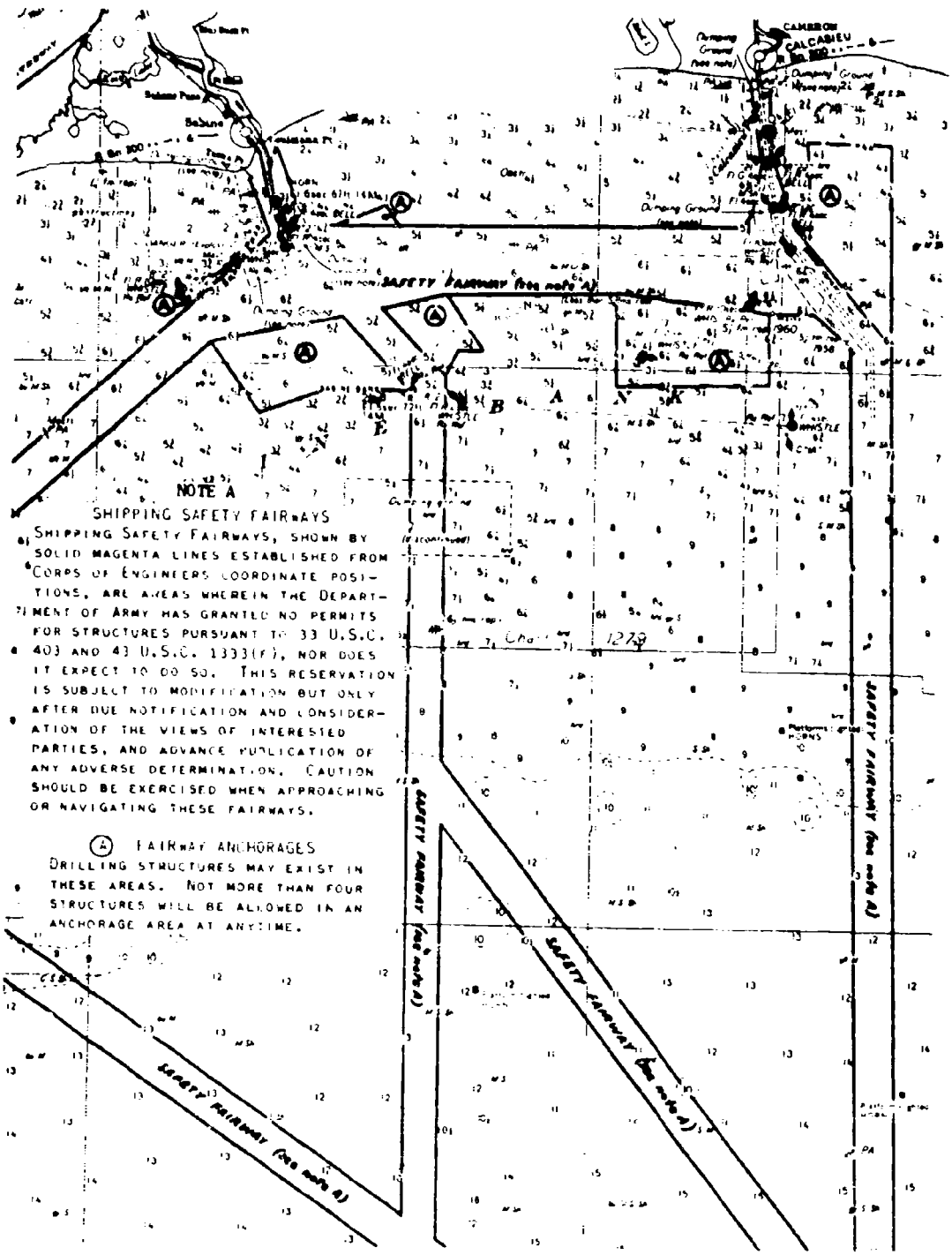
> "Shipping Safety Fairways, shown by solid magenta lines established from Corps of Engineers coordinate positions, are areas wherein the Department of the Army has granted no permits for structures pursuant to 33 U.S.C. 403 and 43 U.S.C. 1333 (f), nor does it expect to do so. This reservation is subject to modification, but only after due notification and consideration of the views of interested parties, and advance publication of any adverse determination. Caution should be exercised when approaching or navigating these fairways."

Offical notice of the fairways and anchorages came into full force and effect thirty days after publication in the Federal Register on 25 January 1966. Copies of the notice were sent to all known interested parties and were also posted at post offices and other public places.

For the past two years Fairways Subcommittees of the American Merchant Marine Institute (representing the shipping industry) and the Offshore Operators Committee (representing the petroleum industry) have been jointly discussing revisions of existing fairways and anchorages and establishment of new ones. On June 2, 1967, these two industry groups announced they had agreed upon and submitted to the Corps of Engineers a joint proposal for an updated, comprehensive system of fairways and anchorages for the Gulf of Mexico. The Corps of Engineers was asked to adopt this system as a whole and not in parts.

Figure 2

Portion of C&GS Nautical Chart 1116
Showing Shipping Safety Fairways in Gulf of Mexico



An integral part of the joint proposal includes rules to cover the following points:

1. The Department of the Army will grant no permits for the erection of structures in the areas designated as fairways, since structures located therein would constitute obstructions to navigation.

2. The fairways and anchorage areas are not permanent and are subject to change after notification and consideration of the views of interested parties.

3. There shall not be any limit, as such, on the number of structures which may be placed in an anchorage area, provided that the center of any one structure shall not be less than two nautical miles from the center of any other structure unless attending equipment extends more than 500 yards from the center of the structure, in which case the nearest structure shall not be less than two nautical miles from such equipment.

4. Underwater completion installations in an anchorage shall be considered to be a structure and shall be marked by an appropriate type of lighted buoy.

5. There shall not be any restriction, as such, on the location of structures with regard to the sea buoy. The anchorage spacing and fairway requirements will be the determining factor.

6. Pipelines shall be permitted in anchorage areas under Corps of Engineers' regulations containing the following requirements: (a) application for construction of a pipeline passing through an anchorage area, including a description of the proposed location, shall be furnished the appropriate District Engineer at least sixty days prior to the date on which construction is scheduled to begin; (b) any pipeline shall be buried under the anchorage area at a reasonable depth to be determined by the Corps of Engineers so that it will not constitute a hazard to navigation; (c) the Corps of Engineers shall submit the pipeline location information to the proper government agencies so that the pipelines may be shown on appropriate navigation charts.

7. Upon proper application and when a permit is issued, pipelines shall be permitted to cross fairways and shall be buried under fairways at a depth determined by the Corps of Engineers in those cases where the pipelines would constitute a hazard to navigation if they were not so buried.

James Oswald
Westinghouse Electric Company
Baltimore, Maryland

Two of our speakers on Monday made reference to an incompatability between science and the law, and I am surprised that no one disputed it when one of them said that science has an appetite for change whereas the law is concerned with the maintenance of stability. This remark could be described as a very restrictive way of looking at the law and a very romantic way of describing science. I am sure we all realize that in treating an environment that is under considerable assault by developmentally-oriented technology, it must be the concern of the law to participate in the dynamics of creating new stabilities in an operational mode of change, and that in so doing the law acts in a very unpreservative way. And I think we should also realize that despite technology's appetite for change, science--being more descriptive than a normative establishment--is concerned with perceiving and describing change within the context of the stability of natural systems.

Ocean science, being all of science when done in the ocean, is no different in spite of its very frontier-like posture. Indeed, if there is any incompatability at all, it seems to me it is the product of mutual ignorance rather than differential modes and it is this ignorance that I would like to make the focus of a few remarks on conflicts of use.

Another speaker on Monday, who is our moderator this morning, made reference to the relative clarities with which we perceive our goals for making social sense out of ocean technology, and of the need for new problem-solving techniques and approaches. It seems to me that he has located the core of our ignorance; for we are at that developmental stage where we can articulate fairly well tables of resources and tables of strategic requirements, but where we cannot create a consensus regarding how we are going to bring the first to bear upon the second. Let alone define our goals, we have not even clearly defined our motives and our methods. Our resultant knowledge I believe is as incomplete as our research, and we have not yet said, or let be said for us, whether we shall manage the oceans with some kind of apollonian clarity or assault it with some sort of industrial dionysian force.

Deep inside I think we all suspect that public planning is doomed to failure, but as proprietors of a pristine environment we pray to be the first man not to repeat the mistakes everyone else has been repeating throughout human history. A serious question arises as to whether the absence of rational utilization is indeed a mistake, or at least whether such schemes are efficient. Furthermore we lack the kind of clearly and publicly demonstrable challenge that is contained within one symbol, one moment of truth, such as was used by the space people. And, thanks to the system of checks and balances, we can't seem to agree whether to develop the ocean for the most basic of humanitarian purposes. Our problems and our failures to be lucid about our use of the ocean seem to reflect the disparities of theory and practice that run throughout the entire decision-making argument of the century. In part, I think, this is the result of having bitten off considerably more than we could swallow and, in another sense, it is the result of our having become too provincial about the 71 per cent of the earth's surface we concern ourselves with. I mean by this that when we began to sell the ocean and ourselves to the rest of the world, we tried to sell the whole encyclopedia, and I am still hearing speeches that sound like dictionaries on every conceivable use of the world ocean.

I also mean that many of us in taking the plunge have tended to overlook those non-ocean developments and ways that may better serve the planet than we can. Now amid this kind of confusion I think that we can build an infinite number of models for ocean use and derive an infinite number of potential conflicts of use, most of which are quite useless except in debate. I think it is well time that social scientists forsook this debate, which I fear we have been enjoying entirely too much, and settled down to the priesthood of becoming useful. In the interest of seeing my own profession perform this practical service I would like to suggest a few things that deserve study if we are to arrive at an understanding of priorities of use, or what I would like to call "predictable irrationalities." In short, if we are to provide predictions of ocean use that are likely to come true, and resolutions that are more than facile, we must become very attentive and rather active participants in the process of technological decision making.

Markets, whether they are consumer or synthetic, frequently seek paths of least resistance, which might be described somewhat more academically in sociological terms as paths requiring least adjustment of symbolic intra-structural and habit-fixation in the selection from among alternatives. We should subject the alternatives presently at hand for ocean use to a thorough analysis of these social adjustments. In so doing, we will learn a good deal about what is likely to be done with success. During the past year I think I have heard at least two dozen new ways of removing protein from the ocean, ranging from the very reasonable on the one hand to the mickey mouse on the other. These methods have been so divergent in their approach that each would create a series of distinct conflicts unlike the other. To the curve of scientific rationality I try to add a second curve indicating degree of adjustment required within the society if this method were applied, and then to select likely approaches for investment. Some of the most reasonable approaches are eliminated immediately or deferred until some other adjustments can be made by non-related events.

The second thing we should study is the behavioral nature of social units. These social units, of course, range from individual units to government, when they are faced with obvious conflicts before the national or entrepreneurial fact.

Thirdly, I think we should totally reexamine our structure of treaties, agreements, obligations, and policies to define for total ocean development what we can or cannot do, and how we are going about creating restrictions on our own exploitative activities for strategic and diplomatic reasons. In such an analysis treaties relating to fisheries would have to be correlated, for example, with policies related to pollutants.

Fourth, we should reconstruct our resource tables three-dimensionally to discover what precise efficiencies apply to environmental alternatives for economic use. And we should add to this those cultural analyses known as marketing surveys, since we all know that there are some very good things that you can't give away.

Finally, we should posit how we intend to use the mass media to create priorities and favorable climates for one or more alternatives to ocean use. In all instances I would stress that we must consider total possible use of the ocean and its resources. Most of these have been described at this conference; two of them, pollution and recreation, have received very little attention. Given this sort of information, the legal profession at least can decide which technologies to investigate for the conflicts they will create if pursued simultaneously and what sorts of agreements and organizations may best serve the state of affairs that is to come. It is hardly possible to construct a problem-solving methodology in the absence of this kind of knowledge of technological specifics and time frame. The question of legal and diplomatic lead time brings me to one final point which stresses the requirement for the social scientist and the normative lawyer to become intimate with the technology. Once we know which alternatives are going to be pursued we must also know by what mode they will be pursued. To give a very simple example: whether an operation is to be manned or unmanned in the ocean is quite important since manned technology on the continental shelves will introduce a different set of difficulties and requirements for protection. If it is going to be manned then we have to know how the man is containerized and what his mobility within that manned situation is.

It remains that we are faced with the incongruity that most of us in law and social sciences who treat the ocean environment have almost no familiarity with it. We are very much like Dr. Shepherd before he saw Scripps Canyon. In terms of the academic community edict of "publish or perish," I think the situation in our case might be "die or perish."

INDIVIDUAL'S RIGHT TO QUESTION UNITED STATES ADMINISTRATIVE JURISDICTION OVER CONTINENTAL SHELF AREAS

David P. Stang
George Washington University
Washington, D. C.

I would like first to thank the chairman and the other directors of the Law of the Sea Institute for extending me the privilege of participating in this panel discussion. Secondly, I would like to disclaim any of the opinions I express today as necessarily representing those of Ocean Systems, Inc., or any other person for whom I have performed consultative services.

There has been much discussion at this conference of economic rent and how the world's nations should avoid all future conflicts and instead cooperate in order to jointly maximize the economic rent derivable from the oceans. The subject I would like to discuss today in a way concerns rent. More specifically it relates to the efforts of individuals who have appeared to be opposed to the idea of affording their government the opportunity to collect a form or rent--namely, taxes or lease fees.

To narrow the subject of the discussion even further, I would like to talk about an individual's standing--or right--to question United States administrative jurisdiction over continental shelf areas. This question arises when individuals conduct commercial operations on the ocean bottom in an area they think is beyond the sovereign reach or authority of the coastal nation. But much to their dismay the coastal national tells the individuals to clear out because they have no lease to use that particular part of the ocean bottom and the individuals respond by declaring that the particular part of the ocean bottom on which they are operating belongs to them and the coastal state has no authority to kick them off.

Only recently have there been instances in which individual entrepreneurs, who without bothering to obtain a lease or other appropriate authority, have traveled out to sea beyond the three mile limit of the United States territorial sea and begun construction projects on the geological continental shelf.

One of these projects was conducted by Acme General Contractors, Inc. The corporation conducted dredging and filling operations on Triumph Reef, which is located approximately fifteen miles southeast of Dade County, Florida.[1] The operations were conducted by Acme despite the denial by the Army Corps of Engineers of the corporation's application for a permit to construct an artificial island.

The apparent purpose for Acme's creating the artificial island was to erect thereon a gambling casino. Mr. Louis M. Ray, Acme's president, however, alleged in federal injunction proceedings that his only purpose was to build and operate a ship's servicing store.[2]

The evidence showed that Triumph Reef is heavily fished by commercial as well as sports fishermen and that the waters over and around it are extensively navigated by both commercial and pleasure craft. Furthermore it was shown that this area has been one of research by countless marine biologists.

Acme, in the injunction proceedings, denied that the court had jurisdiction of the subject matter, namely the reef. The court, agreeing with the government's allegations declared that it had jurisdiction over the parties to, and the subject matter of the cause.[3] The court further declared that the authority of the Secretary of the Army to prevent obstruction to navigation in navigable waters of the United States, by federal statute, is extended to artificial islands and fixed structures of the outer continental shelf[4] and that the irreparable damage to the area and the defiance by the defendants of the exercised authority of the Corps of Engineers justified the issuance of a preliminary injunction. Accordingly, the preliminary injunction was ordered.

It is interesting to note that the Atlantis Development Corporation, Ltd., a Bahamian company, petitioned to intervene in the Ray case. Atlantis had similar plans to develop a resort on Triumph Reef and sought, by intervening, to quiet title to the property it alleged to own by right of discovery. The district court denied Atlantis the right to intervene. Atlantis appealed.[5]

Surprisingly enough Atlantis won the right to intervene, but the circuit court, choosing not to decide the question of title, remanded the case to the trial court. The victory for Atlantis was considered a real upset by the

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[1] See 3 Geomarine Technology, no. 2, pp. 9-12, February, 1967.

[2] See United States v. Ray, No. 65-271 Civ., United States District Court for the Southern District of Florida, memorandum opinion filed April 21, 1965.

[3] See 43 USC §1333(b)(2) (1953); 43 USC §1332 (1953).

[4] See 33 USC §403 (1899) and 43 USC §1333(F) (1953)

[5] See Atlantis Development Corporation, Ltd. v. United States, No. 22, 958,C.A. 5, filed June 12, 1967; reviewed in 35 L.W. 2754.

government. The government's position in the appellate proceeding was that in order for the court to have jurisdiction, the reef area involved would necessarily have to be a part of the United States outer continental shelf and thus Atlantis would have no case; or alternatively, if the reef area involved were not part of the shelf, then the court would have no jurisdiction to hear the case or quiet title.

The court skirted the government's argument by relying in part on a rule of federal procedure which allowed intervention of right (rule 24(a) FRCP). The rule stipulates that the applicant has a right to intervene when it "claims an interest relating to the property...which is the subject of the action and [the party] is so situated that the disposition of the action may as a practical matter impair or impede his ability to protect that interest."

The two "A's," Acme and Atlantis, more recently have been upstaged by another "A" on the west coast. An even more imaginative undertaking involved the attempted creation in the Pacific Ocean by a different group of entrepreneurs, of a new nation called "Abalonia." Cortes Bank, a submerged geological structure located approximately 110 miles west of San Diego, California, was to give birth to this so-called new nation.[6] This area apparently is rich in abalone and lobster and to a large extent remains unexploited. The purported plan of Abalonia's creators was to build a "tax free-sovereign" processing plant on the bank and use divers to harvest the abalone and lobster. The "nation builders" obtained a 366-foot World War II troop ship (the S.S. Jalisco, which had been reinforced with concrete) and towed it out to Cortes Bank. There they moored it and opened the sea cocks, intending to sink the ship in an area only two fathoms deep. In theory the engineering idea was a good one, but in actuality unanticipated rough seas snapped one of the mooring lines and the ship was dragged to deeper water. As if losing money on the venture were not trouble enough, the enterprising group apparently has been threatened by the United States government with prosecution for creating an obstruction to navigation.

Assuming, for the sake of discussion, that the Abalonia incident gets to court, it would not be improbable that Abalonia's attorneys will allege, as did those of Acme, that the court has no jurisdiction over the subject matter. For the court to have jurisdiction the government would need to prove that the area of Cortes Bank in dispute was part of the outer continental shelf.[7]

The Interior Department, which is responsible for leasing the United States outer continental shelf, appears to be absolutely convinced that Cortes Bank is legally part of the outer shelf because it offered to lease this area by publishing appropriate notice in the Federal Register on December 20, 1966.[8] Such publication, according to Interior Department administrative practice, constitutes official assumption of jurisdiction over an ocean bottom area under the authority of the Outer Continental Shelf Lands Act of 1953.[9]

Should the government sufficiently establish that the area in dispute is outer continental shelf, then it necessarily follows, as a matter of law, that the Secretary of the Army has authority to prevent obstruction to navigation caused by fixed structures located thereon.[10]

The government could additionally rely on treaty law to support its case. It could argue that Cortes Bank is part of the United States continental shelf as defined by the 1958 Geneva Shelf Convention, as Cortes Bank is located in an area "where the depth of superjacent waters admits of exploitation of natural resources...."[11] If lobsters and/or abalone are within the definition of the natural resources of the shelf, according to the terms of the convention, and are exploitable on Cortes Bank, then the area, arguably, is part of the United States continental shelf.[12]

Regardless of whether the Abalonia case ever gets to court, the incident itself raises several yet unanswered legal questions. These are (1) regardless of the problem of title to the shelf area involved, whether or not a ship located on a reef 110 miles out to sea is necessarily an obstruction to navigation within the meaning of United States Statutory Law; (2) whether the group's possible future re-floating, re-sinking and securely re-anchoring the S.S. Jalisco to Cortes Bank with subsequent emplacement at the ocean surface of adequate navigational warnings will be held unlawful

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[6] See 3 Geomarine Technology, op. cit.

[7] See 43 USC §§1331(a), 1333 (1953).

[8] See 31 F.R. 16629, Map 6D

[9] See 43 USC §1334 (1953) and 43 C.F.R. §§3300 2(b), 3382.3 (1964).

[10] See 43 USC §1333(f) (1953); 33 USC §403 (1899).

[11] See 1958 Geneva Convention on the Continental Shelf, T.I.A.S. 5578, Article 1.

[12] Article 2(4) of the Shelf Convention stipulates that among the natural resources of the shelf is included, "living organisms belonging to sedentary species, that is to say, organisms which, at the harvestable state, either are immobile on or under the seabed or are unable to move except in constant physical contact with the seabed or subsoil"; see also Cox, California Abalones, Family Haliotidae, Fish Bulletin No. 188, The Resources Agency of California, Department of Fish and Game, 1962.

under the authority of the Outer Continental Shelf Lands Act; (3) whether securing a permit from the Army Corps of Engineers is a legal prerequisite to conducting such operations; (4) whether the Secretary of the Interior is required first to lease, or only intend to lease or publish notice of offer to lease disputed areas of the ocean bottom before the United States can lawfully assume jurisdiction over a particular area the government claims to be located within the outer continental shelf; and (5) whether an individual who asserts a claim to an area of the ocean bottom beyond the 200-meter isobath and who develops the area before the United States "officially" assumes jurisdiction over it by publishing in the Federal Register notice of offer to lease, will be afforded tax-free ownership rights of any nature such as are afforded formal recognition by the United States government, including its federal judicial system?

Taking into consideration current United States policy regarding continental shelf areas, the answer to many of the above questions might well be decided in a manner unfavorable to present and future "Abalonia" creators. The so-called "public interest" as determined by various agencies of the United States government will most likely "best be satisfied" by a continuation of a public lands designation of ocean bottom areas over any adverse claims to title by private individuals, even though such claims are purported to be sovereign.

If the Corps of Engineers mechanism of declaring unauthorized construction projects on the outer continental shelf as obstructions to navigation is to be continued, however, it might in some instances raise equitable questions. Setting aside the tax avoidance purpose of such construction projects, one might justifiably inquire about the fairness of penalizing a fisherman who happened to be innovative enough to indefinitely "park" his vessel on a bank where he is not interfering with any operations being conducted thereon under a mineral lease, and not otherwise interfering with navigation in an established sea lane; and allowing a competitor fisherman to simply anchor his ship in the same area without any governmentally imposed restrictions whatsoever.

In conclusion, there is yet neither a United States, foreign, or international court decision, nor a definition contained in a treaty or a United States statute which in specific terms designates the precise seaward limit of the legal continental shelf in areas where the ocean depths considerably exceed 200 meters. Thus, in relying on the developing leasing practices of coastal nations, particularly those of the United States, it would seem sound to conclude that presently any fortune hunter ocean miner who decides to stake a claim to a section of the sea bed on his own personal authority and without the official approval of the nearest coastal state, had better travel literally hundreds and hundreds of miles to sea before he commences his operation. But even if he is lucky enough to travel far enough beyond the distance that the nearest coastal nation, at that time, dares to extend its jurisdictional reach, the fortune hunter would still have to reckon with the possibility of unchristian competition in the same area from other fortune hunters. Perhaps it is almost pointless to mention that the cost to the first fortune hunter of hiring a mercenary navy to protect his newly claimed property interest might be a bit too burdensome.

DISCUSSION

Question: I wonder if Mr. Griffin would amplify his remarks concerning these offshore collisions.

Griffin: Under the Outer Continental Shelf Lands Act you have to go to the Corps of Engineers for a permit to install your rig at a given point and they have already announced in terms of coordinate positions areas called fairways in which they will not grant a permit for the installation of a rig. These fairways and fairway anchorage areas off the Gulf ports are now marked on the nautical charts of the Coast & Geodetic Survey and they are marked by aids to navigation so that really the only problem now that is unsolved as far as I know is the difficulty that radar has to distinguish between a sea buoy and a rig, thus causing time delays.

But what happens if a ship gets outside of the fairway and collides with an oil rig or other type of shelf installation? There is no authority in the Outer Continental Shelf Lands Act to make compulsory the use of these fairways nor is there any intention to do so. The Federal Register announcement of the fairways expressly says that these are recommended and not required. The reason for that is the master's judgment should be the ultimate factor in stress of weather or other force majeure as to whether he should depart from the fairway. Also the history of shipping lanes on the Great Lakes, starting in 1911 when the Lake Carriers Association voluntarily put in upbound and downbound lanes--again without any compulsory rules or statutes making as a matter of law there use required, is that it wasn't very long before the Admiralty Courts and the Coast Guard's Boards of Inquiry started saying in effect to ships that were in collision outside of marked lanes, "why were you there?" In other words, departure from the lanes is relevant to the question of fault, and I feel certain that this type of legal evolution will take hold in the fairways and also in the traffic separation lanes in and out of the ports of New York, and Philadelphia through Delaware Bay, which the Coast Guard announced early this year. The lanes are left to voluntary use, but if a master cannot justify his departure from them then this will have some bearing on the ultimate question of fault.

Christy: I think that there is another aspect of the question which may be more important. It is not so much the problem of blame, or fault, as it is the additional costs which have to be incurred by either the oil people or the navigation people to reduce the risk of collision. That is, as the oil rigs move out along the Gulf Coast and the fairways are built, shipping incurs extra costs in moving into and going through one of these fairways. It is particularly true with coastwise shipping, where it has to move out say of Galveston and then through a fairway and then around the oil rigs and say back in to New Orleans or some other port. The interesting aspect here is to determine the relative values of the different uses of the area and to find out whether the economy benefits more from the oil that is produced or more from having greater freedom of navigation.

Question: Chris, I could drive to Washington in a straight line over farmer's country if I wanted to but I have to stick to highways, which is a longer route than going straight would be, and I believe that the shipping is going to have to suffer some inconvenience, too. Shipping has had free access to the seas for a long time; if we are going to exploit the oceans for other purposes, shipping must expect some regulations.

Christy: Well, I don't necessarily agree with you. I think that there may be advantages in providing fairways parallel to the coast at slight additional costs to the oil operations.

Question: But oil is where you find it.

Christy: Yes. But there are techniques, for example, for slant-well drilling.

Question: That is too much cost for the oil producers.

Christy: All right. Maybe it would be beneficial for the economy of the United States to have the cost borne by the oil producer rather than by the navigator, or perhaps it may be the other way around. The point is we don't know yet.

Griffin: May I say on this point that the location of these fairways was agreed upon by the oil industry's Offshore Operators Committee and by the American Merchant Marine Institute and then they went jointly to the Corps of Engineers and said here are the places where we want fairways and we agree that they can be moved if we don't find oil alongside a fairway and slant drilling is not feasible in a given situation. So this is a cooperative industry type of arrangement.

Question (for Mr. Stang): Why did the Triumph Reef case stop at the preliminary injunction stage? Secondly, I assume that these were United States nationals in the Triumph Reef case and the Abalonia situation; if they were not what court would have jurisdiction over the people involved and, assuming that a court assumes jurisdiction, how do you propose to enforce court decrees with foreign nationals?

Stang: The reason that the injunction in the Triumph Reef case was a preliminary injunction and that there has been no further adjudication with respect to Mr. Ray and his use of Triumph Reef is that there was another corporation involved. It is the Atlantis Development Corporation, a Bahama Corporation, which had intentions to use the same reef for similar purposes. Atlantis wanted to build a gambling casino and apparently other more sensual attractions. Accordingly, the Atlantis Development Corporation attempted to intervene in the Ray case so that the settlement of the rights to use Triumph Reef for Mr. Ray would also apply to Atlantis. But the District Court of the Southern District of Florida, where the preliminary injunction petition was heard, refused to grant Atlantis the right to intervene.

Out of coincidence, just ten days ago, the Atlantis case came up on appeal. The Fifth Circuit in New Orleans decided the question of Atlantis's right to intervene. The Fifth Circuit reversed U.S. v. Ray by permitting Atlantis to intervene as a matter of right. It was a real upset victory because the government was very certain that the lower court decision was correct. The government contended that since Atlantis was asking the court to quiet its claim title to the area on Triumph Reef the question must be resolved as follows: If the area on Triumph Reef is within the legal continental shelf of the United States (i.e., the outer continental shelf) then necessarily the Secretary of the Army has

jurisdiction to prevent any kind of obstruction to navigation. On the other hand, if the area on Triumph Reef is not a part of the United States continental shelf, under the Outer Continental Shelf Lands Act, then the court has no jurisdiction to hear the case. The court, however, chose to decide the case by relying on one part of the statute which gives Federal District Courts the responsibility for settling controversies as they relate to the continental shelf and Rule 24(a) of the Federal Rules of Civil Procedure. The Fifth Circuit declined to hear the case on its merits; it simply remanded the case to the District Court in Florida to in turn decide for Atlantis and for Ray what the ultimate disposition of the temporary injunction proceeding will be and who, if either, will have the greater right to do with Triumph Reef what he wishes.

Oswald: Continuing on with the question of conflict of uses on the shelf, I will give you an example from my own region of the kind of problem which I think is going to be extremely important. I live by the shores of a large body of sea nettles surrounded by a little bit of water, this thing is known as the Chesapeake Bay. You can practically walk across the sea nettles. The sea nettle is a nuisance to swimmers, and there is a great deal of money in the Chesapeake Bay region spent on people going to the beach and attempting to swim in this brackish semi-polluted water. Recently one of the more enlightened Congressmen decided that he was going to try to get a good deal of money into Maryland to do away with the sea nettles. He did not inquire into what the sea nettle ate, or what ate the sea nettle, or why it was in the Bay in the first place, or why it comes and goes from year to year. The idea was that it must be destroyed because most of the people in this Congressman's district do an awful lot of swimming.

Well, a fellow who lives in an island on the other side of the Bay and who has a degree in biology said, "Now hold on. If you remove the sea nettle from the Chesapeake Bay you may also be doing some very serious things to the oyster because there is some kind of strange symbiosis going on between the sea nettle and a snail-like creature which takes care of a good deal of the oyster's excremental matter." Another individual feels that the sea nettle's removal may create a problem which the swimmers will be even less happy with; that is, these waters might then provide an optimum environment for sharks. However, for these biological changes to take place would require at least seven or eight years and the Congressman in question may not still be around then.

While all this is going on the Department of the Interior is zoning the Bay. We have some very interesting things going on with regard to zoning. I don't know if you are familiar with the Potomac River, but the Maryland side of the Potomac has entirely different standards at the moment than the Virginia side of the river, and yet the living resources that are in that river are rather common to both sides, as are the gunboats. Our real difficulty, close to the coast, especially in estuaries, arises I think as we face the problem of trying to put food legislation and pollution legislation together. The industry which deals in living resources I feel has not been sufficiently attentive to pollution legislation at the present time, because we are likely to upset some balances which cause a good deal of grief for industries like the oyster industry.

On political orders, I can only point out that investors are a funny people in that they do not like to invest in a situation which is going to be wiped out overnight. I do not think that we need political orders which are rigid but only such orders as protect investment. One suggestion that has been made has to do with an indemnification situation which could be set up through international banks. As you look at the map that was brought in here (drawn by Dr. Christy), and as you try to think in terms of investment and political order in relation to that map, you find a couple of very curious things. I might go out tomorrow, for example, and put a very expensive fixed station in the ocean, and I may find that under the law of the land I am dealing with the government of Nigeria. After I have completed my investment I find out that I am not dealing with the government of Nigeria at all because it developed that the land boundary moved and therefore its application, its extension into the ocean moved, and I find that I am now dealing with the government of Biafra. We are attempting in many instances here to establish political orders in the ocean in the absence of stability of political order in the adjacent land, which is why this kind of order cannot be established. We can, however, reach an economic solution in very much the way that insurance companies have been reaching economic solutions for a long, long time.

I would like to bring up one other thing that I think applies to this. We started out this discussion by talking about what was going to happen when a ship hit an oil rig or vice versa; today there is considerable money being expended in the process of removing the equipment put in the ocean by the petroleum industry from the way of shipping. But technology as it breaks free of the interface faces a whole new set of problems. Soon the Atlantic fleet will no longer be running into oil rigs but rather what we are up against in the long run is a subsea rig being hit by a Perry Submarine. This is an entirely different problem than that which we face in talking about seaways because there are no established underwater routes. You position yourself in a vessel underneath the ocean according to what you are trying to look at or blow up. This has traditionally been what we have done. Yet at the same time as the petroleum technology is breaking free of the interfacing and going under we may find increased development in submarine transport. We have effectively transferred the surface problem down below, where frankly it is a bit more difficult to see and to adjudicate, and where it is more possible to have what we might call a "hit and run" situation than we do at the present time. So I feel we have to be looking towards some kind of an agreement which is capable of solving that kind of problem--not necessarily in the same terms that we have solved the problem on the surface because we are now mobile in a three-dimensional column. Your safety zone, if there is to be such a thing, is involved with up and down as well as around on the surface.

Chapman: Mr. Chairman, there is one aspect of this whole situation that does not get discussed much in these conferences and I want to bring it up on top of the table. As I mentioned a while ago, you don't solve any of these things relating to the high seas except by an agreement of sovereigns. Now sovereigns are an unusual classification of people because they are independent. The way this affects the situation is that you come into a conference of plenipotentiaries with a very well thought out objective and view, thinking that really you have quite good agreement. You are liable to get pretty nearly as many votes as you need, but there is some other rascal of a sovereign that has an objective also, that is not necessarily incompatible with yours. In the course of pressing for his objective he uses up a great deal of your voting strength and causes a great deal of irritation around and about, so your voting situation for your reasonable proposition has been dissipated and you don't know what you are liable to end up with. This was the experience actually

in the 1958 and 1960 conferences and in other conferences of plenipotentiaries where I have been on hand where a multiple group of sovereigns were involved. Before you get into any such conference with any well thought-out series of objectives even the United States government--or any other sovereign--will have to make a very serious study of what other things are likely to be brought up by other sovereigns in the conference and how they will affect the issues that the United States wants.

It is so easy to disrupt these conferences. I remember the delegate of Iceland, a very capable man, upsetting the United States and the whole community of nations at the General Assembly in 1954 simply by putting forward the very reasonable proposition, "Don't settle the continental shelf issue out of its context with the whole of the high seas issues." This was a reasonable position. He got the vote for it. As a consequence of this we dealt with fisheries, a high seas regime and everything but the continental shelf thing, which is all that the United States wanted to consider. I just do not think this is understood by people who are making all of these suggestions of how we ought to change international law.

Christy: I agree with Wib on this. I think I may disagree a little bit though, with respect to the approach and the kinds of information that are needed. You suggested that we have to approach these international forums not only with our own position well in hand but with the knowledge of the position of the other sovereign states and I think that this is entirely true. I would suggest that what we need in this area is perhaps not much more conferences but more research, particularly of the kind that will help us to evaluate the costs of different alternatives (and I don't mean monetary costs alone)--of different alternatives for all of the participating nations. In other words, as in Crutchfield's paper which I read the other day, the idea of reaching a second-best solution is particularly important--a second-best solution showing that by these kinds of arrangements all parties will be better off than they are under the current kinds of arrangements. This to me is where critical research is required--to demonstrate and to show how, in some of these potential conflicts and actual conflicts, alternative solutions will affect all of the parties. And I would suggest that a large part of this analysis, not the entire part but a large part, should be economic.

Harlow: The remarks made by the panel were both illuminating and stimulating. Of particular interest was Dr. Chapman's conclusion that territorial sea claims and fisheries claims are, in a practical as well as legal sense, inseparable. I would appreciate the opportunity to comment on several of his conclusions in this regard, not in any representative capacity, but as an individual having an interest in law of the sea.

Dr. Chapman stated that when the United States gave qualified support to a six-mile territorial sea (the so-called "6 x 6" proposal) at the Geneva Conference in 1958, the three-mile territorial sea was "thrown out the window." I would submit that this is an oversimplification of the situation that existed at that time. To place this difficult and complex problem in perspective there is perhaps no better statement than that made by Dr. Chapman in 1954 before the Committee on Merchant Marine and Fisheries, House of Representatives. In discussing his support for federal legislation which would provide financial assistance to United States fishermen arrested on the high seas, he stated:

> " The immediate incident which gave rise to the present legislation was the passage by the 10th Inter-American Congress of a resolution (appendix 2), 'That the Council of the Organization of American States convoke in 1955 a specialized conference to study, as a whole, the various aspects of the juridical and economic regime of the Continental Shelf, the waters of the sea and the natural resources therein, in the light of present scientific knowledge.'
>
> " This resolution would not give much worry except that it had originally contained this clause (appendix 3):
>
> 'The 10th Inter-American Conference reaffirms:
>
> 'That the sovereignty and jurisdiction of each of the American riparian states shall extend to the submarine continental and insular shelf off the continental and insular coasts of their territories, regardless of the depth of the ocean above the said shelf, and to the existing natural resources or those that may be discovered therein and in the waters above it.
>
> 'That such national sovereignty and jurisdiction shall include an area of 200 marine miles, reckoned from the outermost points of the coasts, as the most adequate means of preserving and facilitating the conservation and utilization of the natural resources of each state.
>
> 'That, consequently, it shall be the duty of the riparian state to supply the legal, regulatory, and technical measures for the conservation and prudent utilization of the natural resources now existing or those that may be discovered in the said areas under its sovereignty, for its own benefit, the benefit of the hemisphere, and the community of nations.'
>
> " What really caused the fishing industry of the United States to jointly request this action from the Congress at this time was the discovery that had the original resolution come to vote it would have passed by a margin of about 14 to 6, that the original resolution failed to come to a vote at Caracas by a combination of luck, diplomatic skill, and parliamentary maneuver which were not likely to be repeated at a second conference, that this was supposed to be the near-terminal play of a most skillful multilateral diplomatic move, and that the diplomatic officers of the United States were surprised to find that they had won this hand to the extent of gaining a year's grace before the game ended."

Based on Dr. Chapman's characterization of the problem in 1954, it seems clear that even at that time the territorial sea question was a serious and vexing one. What I am suggesting is that while the qualified support of the United States for a six-mile territorial sea in 1958 may have added to the confusion, doing so did not to any great extent change the situation. In other words, the suggestion that had the United States let well enough alone at the 1958 Conference there would have continued to be significant world-wide agreement on a three-mile territorial sea is subject to some doubt.

Dr. Chapman expressed the view that the fact that the United States has attempted to separate the concept of territorial sea claims from the concept of fishing claims by its enactment and implementation of the Bartlett bill wherein the United States claimed a fishing zone nine miles in breadth measured from the outer limit of the territorial sea, contributed further to the destruction of the three-mile limit. In actual practice it is difficult to point to an example where a broader territorial sea was claimed as the result of American attempts to separate fishing claims from territorial sea claims. To the contrary it appears a valid argument can be made that had no support of such concepts been recognized, the many nations that have made fishing claims beyond the territorial sea would instead have extended the territorial sea to the outer limit of the fishing zone.

Dr. Chapman expressed the view that the separation of fishing jurisdiction from territorial seas is illusory and that in practice one will lead to another. This is certainly the risk inherent in attempts to separate the two problems. However, at the present time, over thirty states do in fact recognize a difference in law and in practice between territorial sea claims and fisheries zones. While forecasting what the future will bring is a difficult if not impossible task, it may well be that on the balance there is less risk in attempting to separate the concepts in an effort to accommodate the economic as well as political and security needs of the community of nations. It is worthy of note that the Santiago Declaration agreed to in 1952 by Chile, Ecuador, and Peru was solely concerned with economic factors and did not mention problems of security and self-defense. Although it is true that Ecuador and Peru have made 200-mile territorial sea claims, it is significant that at the present time Chile does not treat the 200-mile zone proclaimed in the Declaration as a territorial sea. Recently Argentina proclaimed sovereignty over a 200-mile zone adjacent to its shores but specifically stated in its proclamation that the claim in no way affected water or air navigation. These examples are cited to demonstrate that even in the difficult arena of South America, which was so vividly described by Dr. Chapman in 1954, there are attempts being made to distinguish between classical territorial sea claims and claims over living or non-living resources.

Although Dr. Chapman is well-advised to point out the danger that resource claims may gradually evolve into territorial sea claims, I would submit that failure to recognize and support a distinction between fishing claims and territorial sea claims would in all probability not retard but markedly accelerate the proliferation of broad territorial sea claims, particularly in the less developed areas of the world.

Chapman: I will point out that it is an unfair advantage on the part of JAG in having bright young officers on the staff who read papers.

I think the main thrust of my thought on this subject at the present time is that, as clumsy as it seems to be, we are probably better off to just muddle along, doing the best we can, dealing with the individual problems on an ad hoc basis, temporizing and reaching agreement through diplomatic efforts, than we are having another conference at this time where we attempt to get things set down in concrete form. I think these conferences have a worse disrupting effect on the entire field of the law of the sea than do the incidental problems that cause so much temporary trouble but which can usually be handled one by one in a reasonably satisfactory fashion.

Anything you do with respect to the law of the sea has some implication on the entire power structure of the world. You can hardly stick your thumb in the ocean but what you are disturbing the power structure of the world. When the power structure of the world is in such a state of flux you cannot realistically expect nice clean-cut decisions on any aspects of this law of the sea business. You have just got to muddle on in the law of the sea until the world power structure stabilizes somewhat more.

Herrington: I planned to hold these remarks until tomorrow but since we are on the subject I will make them now. I am concerned with the impact of our ideas on the body of nations. I sit and listen to the scientists talk about the kinds of regimes that would be of interest to them or the kind of regimes that would be of interest to the lawyers, but I haven't heard too much discussion or analysis on the kind of regime that will appeal to the world. A great deal of thought should be taken toward the question, "What are the problems of other countries, what kind of regime will meet these problems and get the necessary support to make it international law?" If we don't do that we might well go into a conference with one thing and come out with something we don't like at all. Now one reason for our relative success in fisheries proposals in the 1958 conference is that we had spent a lot of time from 1954 to 1958 talking with various people from other countries, finding what their problems were and finding to what extent we could work out proposals they could support, that they all found would be helpful. I would suggest that this Institute consider more effective means of political or social research into the needs and desires of other countries to see if there is some regime that both we and they could support.

McKernan: I wanted to comment a little bit on the remarks of Commander Harlow. This is a most interesting question whether or not one can, in fact, separate economic jurisdiction from territorial jurisdiction and I have some comments to make about this. I don't think we fish people would particularly care, that is, I don't think we would object, to separating the territorial juriadictional question from the fish question, but I believe that we interpret the sequence of events in the past few years somewhat differently than the Commander does. For example, he uses the case of Argentina. Under the same law, the government of Argentina has not chosen to exercise full jurisdiction, but her law is

clearly written so that she can at any time she wants to go ahead and assert further jurisdiction in her interest. The United States move to the twelve mile fishing position was, I think, interpreted by many nations around the world as asserting partial jurisdiction. I question whether the vast majority of nations today recognize the difference in partial jurisdiction over fisheries and full territorial jurisdiction. I am inclined to think that some of the action since that time, including the action of Argentina, more particularly perhaps the clear action by Ecuador quite recently, indicates that these nations could take our action and perhaps the action of anyone else asserting partial jurisdiction and expand that limited concept in ways contrary to our interests. I would agree with Bill Herrington's point that what we do in this area does have a great impact everywhere in the world; but I am not ready to accept the thesis that the family of nations in the world is ready yet to fully recognize the difference between partial and full jurisdiction over broad areas of the ocean.

Chapman: One thing we did find to be of great assistance in this whole maneuver was the concept of maximizing the physical yield from each resource in the world. This was socially acceptable throughout the world and that was what we built the whole fishery case around; the one thing where the common denominator socially acceptable existed. In order to get another agreement on something else I think you are going to have to find something else that has that same degree of social acceptability.

Christy: I am glad you raised that point, Wib. First what I wanted to say was with respect to what Don McKernan was saying. I think that this indicates the necessity, or indicates the degree of urgency that is at hand. That is, as states are tempted to move out their jurisdictions farther and farther, though they be simply for fisheries or for some other special use, it may indeed lead to a more complete kind of sovereignty. And as they move out it seems to me that the pressure is for the national lake kind of solution, and if this happens I would question whether or not this is desirable to the interest of the United States in terms of military needs, in terms of our mining and petroleum needs, and in terms of our fishing needs. And I would question whether or not it would be desirable for the world as a whole to arrive at a regime which simply divides up the ocean along the mid-points. So, I think the tendency that is growing, appears to be growing, for nations to extend their limits farther out, is something that creates an urgency, a very great urgency, for arriving at a solution. Now we may find that the national lake approach is the most desirable one. I don't think it is but some people may feel so, and I would guess that in part those who say "do nothing, let us let the law follow the developments," are indeed assuming that this kind of national lake approach is beneficial to at least their short-term interest. As an acceptable, viable regime over the long run I don't think it could work, mostly because the Soviet Union would get so little share of the total pie. And I cannot imagine any kind of a regime being successful that is not acceptable to the Soviet Union.

ALTERNATIVES FOR MINERAL EXPLOITATION

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Before I get involved in my discussion concerning deep sea mineral deposits and any potential law that we may choose to saddle ourselves with in order to allow exploitation of these resources, I would like to mention something about other resources of the sea that are apparently exploitable and for which activity we will probably need some laws in the near future. The obvious resources of the sea for development are, of course, the fisheries which are now under development but which apparently could stand further development, energy sources of the sea, waste disposal, climate control, and mineral deposits.

Concerning fisheries, if we merely increased the efficiency of our present techniques of taking fish from the sea, according to certain estimates, we may raise the food production of the ocean by a factor of ten or so. But by creating artificial upwellings in the sea we can probably increase the productivity of the ocean by factors of as much as 100 or maybe even 1,000 over that of the present levels. Wherever we have natural upwellings occurring in the ocean we have great populations of fish. In most areas of the ocean, however, we find the waters horizontally stratified with little vertical mixing. In some of these areas the layers of water at the bottom are less dense than the overlying water. By setting off an atomic bomb or some other energy-creating device it may be possible to force upwellings which, once initiated, will continue of their own volition because of the lower density of bottom water. By creating such an upwelling we would also create a fish population, and at those points in the ocean where we choose to do so rather than where nature has provided.

Upwellings could also be created by extracting energy from the sea itself. Mankind is now taking power from the sea by harnessing the tides, such as is done in France. There are probably ten or twelve other locations in the world where the proper configurations of offshore and onshore geology occur and the range of tides is sufficient so that power can be extracted economically. Another method of extracting energy from the sea can be used, however, which method shows much greater promise than tidal generators. Throughout much of the ocean a temperature differential exists between the surface layers of water and the water below the thermocline, which differential can be as high as fifty or sixty degrees. The French have experimented with techniques of using this thermal differential for power production for many years, but they always insisted on putting these plants on land and were forced to spend most of the energy that had been created in pumping the water into and back out of the plant. Recently a floating power plant was designed which eliminates the pumping problem. The cost of these plants seems to be about $200 per kilowatt of capacity which is a little bit more than the $150 to $175 per kilowatt of capacity that is spent for conventional thermo plants on land. But as the fuel in an oceanic power plant is free, production costs for the power at the plant will apparently be somewhere in the neighborhood of 50 to 75 per cent of the production costs of power from traditional thermal plants.

The amount of power that can be extracted from this thermal differential, as it presently exists in the ocean, even if it is possible to get only 1 per cent of it, is about 1,000 times the present annual world consumption of power. More significant, because this energy is being supplied by the sun, it is being added to the ocean at the rate of about 100 times the present world consumption of power. Oceanic power plants placed at various points in the ocean may be a factor to deal with in future deliberations concerning marine resource development. Presently we have a configuration of currents and temperatures that would allow the apparent economic operation of these plants off such cities as Miami, Bombay, Rio, Manila, Honolulu, and so forth. The best location in the ocean for extracting power, however, is in the tropics where there is no need or market. However, with the space industry perfecting techniques for handling liquid hydrogen and oxygen I think we can convert the seawater itself to these two liquids and then ship them ashore to be used in thermal plants, or, in another ten or twenty years, after several thousand people have choked to death from smog in various U.S. cities, fuel cells, as automotive energizers, may provide a substantial market for these materials.

In waste disposal I believe we have reached the point where we can no longer indiscriminately dump wastes into the ocean. The ocean, however, has a great capacity for absorbing a lot of the garbage from the continent and by proper engineering studies of certain basins I believe we can designate certain areas in the ocean that will absorb vast quantities of certain types of wastes from the continent without polluting the rest of the sea.

Turning to marine mineral deposits which, I think, are a most pressing problem mainly because in the next decade we are going to see an explosive growth in ocean mining, the same as we witnessed in the offshore oil industry in the past fifteen years. The nearshore submerged placers will probably receive most attention over the next few years as far as offshore solid mineral exploration is concerned. In general there is in existence a body of law covering exploitation of such deposits and I will tend to center my discussion on other types of deposits in the sea not presently covered by any legal regime.

Frequently I am quite disconcerted when I hear people describe techniques of mining mineral deposits in the sea without knowing anything at all about the character of these deposits. They tend to think of these deposits in terms of continental mineral deposits. In like manner, you can't arbitrarily take laws concerning mineral exploitation on land and apply them to the ocean deposits because the deposits in the sea are simply not the same as land deposits, neither in their geological character, their composition, or degree of spatial concentration. For example, consider oceanic phosphorite nodule deposits off Southern California. From all indications there is only a mono-layer of these nodules at the surface so there is no great tonnage of this material per unit of area. Normally, in land leasing procedures we are concerned with three-dimensional deposits; in the sea some of the best looking deposits from an economic standpoint are only two-dimensional. They are only at the surface of the sediments, spread out over huge areas. Consequently, leasing regulations must take this into effect by granting very large areal concessions rather than small ones.

Other interesting mineral deposits in the sea are such materials as red clay, calcareous and siliceous oozes, and manganese nodules. Deep ocean red clay deposits may grade to 0.2 per cent copper, which is practically ore grade as concerns some land copper deposits. Red clay also has a small percentage of copper. Nickel and cobalt would be recoverable. Also, in some areas it contains as high as 25 per cent alumina which puts it in the same grade area as some continental clays which are being considered as sources of aluminum on land. Tonnage estimates of this material are up in the 10^{16} ton ranges which makes reserve measurements of tremendous size. These clays are unconsolidated, they are fine-grained, and they are in a water atmosphere that allows the use of an automated hydraulic system for mining.

Oceanic calcareous oozes have a composition very closely similar to that of limestone used in making Portland cement. In the deep sea we have great deposits of diatomaceous oozes which would serve in the same applications that diatomaceous earth from land deposits now serves. Also in the deep sea we find the ubiquitous manganese nodules. The nodules are generally about two inches in diameter and are found resting at the surface of the unconsolidated pelagic sediments. Sea water is saturated with manganese and iron in solution and these two elements precipitate in the sea as colloidal particles which slowly filter down through the water column. The particles have the ability to scavange from sea water such elements as copper, nickel, cobalt, lead, and so forth, which elements are vastly undersaturated in sea water, and, because of their electric charge they tend to agglomerate in nodules at the sea floor rather than settling as fine grains into the sediment. Concentrations of these nodules as high as 100,000 tons per square mile of sea floor can be found. Our latest estimates indicate that there is some 1.5 trillion tons of these nodules on the Pacific Ocean floor alone. Reserves of many industrially important metals as nickel, copper, manganese, and cobalt are measured in terms of thousands of years at present consumption levels.

Of the many interesting facets of the nodules, one of the most interesting is the change in the compositional character of the nodules from place to place in the Pacific Ocean. Along the continents they are rich in iron while in the central part of the ocean they are rich in cobalt. In several areas of the Pacific we find nodules which are almost 100 per cent manganese dioxide, while in areas of the ocean far removed from islands or continents the nodules are rich in nickel and copper. As we approach the Equator the percentage of copper in the nodules increases markedly.

Some very interesting statistics concerning the economics of mining these nodules have been developed. The capital required for a deep ocean mining venture is indicated to be somewhere in the neighborhood of $50 to $100 million. The cost of mining, processing, transporting, and marketing the products should be somewhere in the neighborhood of about $15 to $20 a ton of raw nodules, out of which the miner would get about $70 a ton of salable products. One of these operations could generate about a quarter of a billion dollars a year of basic products. The indicated profitability should be somewhere in the neighborhood of $100 million a year after taxes. So the financial incentives are certainly there.

Concerning probable laws as far as continental shelf areas are concerned I think they are fairly well covered, or, at any rate, the potential for coverage is there. Any nation that wants to claim an area off their coast and set up a system of laws to exploit that area gains the authority of doing so by ratifying the 1958 Geneva Convention on the Law of the Sea. I think, however, that it would be in the interests of the mining community to encourage a uniform offshore leasing code for the world insofar as such is practical.

As far as the deep sea deposits are concerned, generally, where there is an unlimited amount of a resource, no one gets too excited about anyone else exploiting it. Certainly, this is true in the case of taking oxygen and nitrogen from the atmosphere or in the taking of minerals from sea water. No one pays a royalty to anyone else for exploitation of such resources and no one answers to anyone else in exercising his right of exploitation. With the recent discovery of limited size, but high-grade bodies of water within the hydrosphere, this situation may change; certainly it will if these bodies of water do not shift their position in space. Because manganese nodules and other deep ocean deposits do not shift their position periodically, they are susceptible to leasing and mining laws.

I suppose there is some reason for wondering why we should even consider passing laws on the mining of materials from the deep seas. Probably the first is that some people have seen in the nodules and have promoted them as a source of income for some needy political bodies. Now such a move as giving ownership of these deposits to agencies such as the United Nations would, I think, be a mistake at this time. I do not think it is wise to give any political body an independent source of income. Legislatures tend to forget who they are legislating for if they are not directly and immediately dependent on the electorate for their financial well-being. Also, the United Nations is simply not organized to govern ocean mining. It has neither the staff, technical knowledge, or finances to promote deep ocean mining.

Another reason for not giving ownership of the minerals in the deep sea to the United Nations is that the UN has certain vested interests which might be momentarily economically hurt when the production of metals from these deposits is initiated. Since these nations that will be hurt when large amounts of copper, nickel, cobalt, manganese, and so forth start being produced from the ocean constitute not an inconsiderable proportion of the members of the United Nations, I think that to put the responsibility of such a step with that body might tend to stifle the initiation of deep sea mining.

The mining and oil companies, of course, are probably the only groups, short of governments, which can raise the necessary capital to exploit these deep sea minerals on a large scale in as high a risk venture as deep ocean mining would initially be. To take these risks these groups, I believe, would like to see some laws governing exploitation of these resources. Why? Well, these groups have always had laws which give them an exclusive right to exploit resources in a given area. This exclusive exploitation right is a cornerstone of the natural resources industry and they simply do not know how to operate in a situation where there is no such right or law. Deep sea mining is a new situation for them, and, of course, no good company president would ever make a move in this field without first consulting his lawyer and his lawyer will only tell him that we need some protection here and we need some laws. Knowing where his source of income lies we could hardly expect the lawyers to say else.

Why then bother with the nodules? Well, the simple fact is that if the rest of the people of the world want to start consuming raw materials at the same level as the developed nations of the world now consume them, we simply are going to have to go to the sea; there is just not enough of many of the vital mineral ores available on the continents. If worldwide consumption of copper for example is to rise to 30 million tons per year, to which level it would have to rise if everyone on earth wanted to use copper to the same degree that we use it here in the United States, considering that some 200 million of us consume about 30 per cent of the world production of about 6 million tons of copper annually, the present land reserves of copper would last only seven years assuming no rise in the sell price of copper.

But the real attraction of the manganese nodules is not that they are there in almost unlimited amounts, but, that it apparently would be much cheaper to produce copper and other metals from these nodules than it is now to produce these metals from land deposits. Also, we have a great deal of flexibility as far as increasing production rates suddenly or in changing grades as the market changes with manganese nodules. We do not have such flexibility in mining land deposits. So we have reasons to want to develop the deep sea deposits.

While we may say that these deposits are for all practical purposes unlimited in volume, these deposits vary greatly in value from one location to another in the ocean. The major reason no one gets excited about anyone else taking oxygen and nitrogen from the air or magnesium salt or bromine from the ocean is that the sea water and air are approximately the same in composition of these materials throughout the world. This is not so with manganese nodules. There are forty or so factors which we have to take into account in judging the value of the manganese nodule deposit, such as grade of the deposit, depth, location in the ocean with relation to consumption centers, nearness of livable ports, size of nodules, concentration of nodules, the ease with which they can be reduced to salable products, weather, topography, and so forth. Thus, the nodule deposits vary greatly in value from place to place in the ocean and to optimize the profitability on an investment in a dredge and plant to refine and process the nodules, a company will have to explore for the best deposit for them in the ocean. In doing so he would spend a great deal of time and money and he will want to have some protection on those deposits he discovers.

It is primarily because the potential miners of these deposits will want some legal system governing the leasing and exploitation of the deposits that we should think about it. And we must regard the development of these deposits as a net increase in the total well-being of people of the earth even though small groups of people will obviously be hurt, probably only momentarily, when production of these metals is initiated from the manganese nodules. On the other hand, we who now have to purchase these metals from certain foreign sources may regard the development of the deep sea deposits as freedom at last from the gouging policies of some of the nations that happen to control very large reserves of certain of these metals. From this standpoint alone I do not know how we could prevent raw-material-poor nations like England, France, Germany, Italy, and so forth from wanting to and developing these deposits. We can also take the point of view that in developing manganese nodules we are preventing the major nations from plundering the resources of these underdeveloped nations so that they will have these great deposits of copper and so forth for their own use in the future.

Given the provisions that it is for the general good of the world that these deposits should be developed, what is the best way to go about it? The notion that the 1958 Geneva Convention gave authority to nations to extend their limit of authority to whatever depth of water that permits of exploitability of minerals, now known as the exploitability test, I think is really academic. I don't think that the members of the Commission had that in mind at all. They really felt that the boundaries concerning authority over exploitation of minerals from adjacent nations should stop some place at something that can be construed as the continental shelf. I agree with Christy and Brooks that the outer limit to nations with regard to mineral exploitation on or under the sediment or rock of the continental shelf should be fixed but I do not however entirely agree with their 100 mile or 200 meter line, whichever occurs furthest from shore. Instead, I would fix the boundary at about the 2,500 meter line. Now the movement of the boundary from the 200 meter line to the 2,500 meter line would not include much more territory for adjacent nations. About 12 per cent of the total area of the ocean floor lies between the 200 meter isobath and the 2,500 meter isobath. Some nations will get a relatively great chunk of the ocean floor as did some of them when they took the continental shelf into their territories and some nations will again be short-changed in this matter. But that is the way it is. Inside of the 2,500 meter line would be the property of the adjacent nations as far as ocean floor mineral exploitation is concerned. Outside of that line is the open and free, hopefully free, ocean.

After that is accomplished I would set up a procedure which allowed the nationals of any nation to stake claims on any area of the ocean floor they wished. The size of these claims for individuals should be limited, probably somewhere in the neighborhood of 5,000 square miles, but, of course, this should be adjustable. Five thousand square miles would contain about 100 million tons of manganese nodules which should be an amortization tonnage for any capital investment necessary to put that property in production. The aggregate claims of any given nation should be limited so that the total area claimed would not contain more than 200 years' reserves of one of the major economic minerals in the nodules, which are manganese, nickel, cobalt, and copper. Thus, nationals of the United States would be limited to a total claimed area of about 6 million square miles of the ocean floor, which area would normally contain 200 years' reserves of copper for the United States at her present rate of consumption. These areas allowed would, of course, be adjusted as consumption rates change.

If all of the 6 million square miles would be taken up it would require some 1,000 separate claims. Since only about thirty of these operations could produce the total United States consumption in copper annually, not to mention the tremendous overproduction of manganese, nickel, and cobalt, that would be produced as a by-product, unless the operators wished to court bankruptcy, only a small fraction of the allowable area will actually be taken up.

Registry of the claims would be with some international body, such as an agency of the United Nations. Laws should be drawn up concerning multiple use of the areas, so that mining does not interfere with fishing, shipping, cables, and vice versa. Some clause of the law would require performance on the part of the claimant and the spending of some nominal sum like $100 per square mile per year to hold this claim, the money to be paid to the UN for a period of ten

years with the request to renew the claim at the end of each year if the holder chooses to keep the ground but not operate on it. If the claimant fails to spend the money, he forfeits his claim. Affidavits, of course, should be filed that the money is being spent and United Nations observers have to have access to the property so that they can see that it is being spent.

If any group chooses to operate without a United Nations permit, it should be allowed to do so but still must observe the multiple use and conservation laws governing the exploitation of the resources of the sea. Admiralty laws concerning piracy should prevent anyone from interfering with his operation. If a company is operating in an area then no one else can stake a claim within twenty miles of his point of operation on the day that this claim is staked. When mining ensues on staked claims, a royalty of some nominal amount, sufficient to support the administrative costs of the United Nations in this program and this program alone, should be levied. Also, when mining ensues, the provision governing exploitation expenditures in that area should be dropped. These provisions are pretty much the same as we have on land except that they allow people to operate in the ocean without any claim if they choose to do so. But if they choose to do so, they have to be prepared to have somebody mine near them. Considering the disciplines of the huge capital investment that will be involved in initiating exploitation of these deposits and the difficulties of breaking into the markets, my feeling is that we are not going to have that kind of competition.

We might also consider briefly some of the laws that might encourage exploitation of these deposits on the part of individual governments, say our own government. To encourage exploitation of offshore solid mineral deposits, the federal government of the United States should grant a tax holiday for a period of three years after production ensues on new mining operations in the sea.

Also the law should be changed to allow duty-free entry of minerals secured from the ocean into the United States. With these laws and procedures I feel that the deep sea mining could become a reality within the next decade. Let us only hope that some interminable international law convention will not serve to hold up these developments. To forestall such a situation I would resolve that any future law of the sea conference to pass legislation concerning high seas operation be held in Thule, Greenland, or Nome, Alaska, or maybe Irkutsk, Siberia, instead of Rome, Miami, Honolulu, or Geneva. I suspect that we could get such a law adopted in a reasonable amount of time.

REMARKS ON THE MINING OF DEEP OCEAN MINERAL DEPOSITS

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A few months ago, we were led to understand that certain speakers at this 1967 Law of the Sea Institute Conference would propose legal and political measures for regulating the mining of deep ocean mineral deposits. Whether or not such proposals have been or will be made during the course of this meeting, or at meetings within the next few years here, we strongly caution those concerned to avoid making or endorsing premature recommendations concerning deep ocean mining.

The reasons for advancing this word of caution are many, but the most important reason is the simple fact that insufficient deep ocean data have been gathered to permit an adequate understanding of the mineral forming processes and enrichment mechanisms resulting from geological, geochemical, and/or biological inter-relations. Without a better understanding of these processes, both past and present, we don't believe any group (or person) can now state that there are important deep ocean deposits of a particular metal or combination of metals; and, that the size, continuity-in-grade and profitability of these deep ocean mineral deposits can be calculated. If statements of this kind cannot now be made (which is our position), then there is no qualified group to make sound recommendations for international regulating action because, to be realistic, such regulating actions would have to consider prospecting and mining costs, concessions size allocations to encompass minable deposits, appropriate periods and mechanisms for tenure, and similar questions.

As an example of the difficulties to be faced, let us consider manganese nodules which are, perhaps, the best known of the potential deep sea ores. Can anyone unconditionally state that there are numerous deposits of manganese nodules that should be classified as ore? If anyone is so bold, dare we believe him? In other words, do we know the grade, especially its continuity over a large area and, furthermore, are we sure of uniformity of abundance, over an area of adequate size, to amortize a plant investment to recover and process these nodules? Can technology now, or in the near future, provide economical mining and processing systems; do we know enough about the ocean environment in the particular areas of these deposits to evaluate what operational problems might be expected; and, will the answers to these questions permit a realistic estimate of the profitability of these deposits?

Considering the above, and the fact that a proposal endorsed by this Institute could help precipitate international action affecting the legal status of the deep ocean bottom, are we, as a nation, really prepared to make in the near future [illegible] existing international arrangements regulating deep ocean mining of manganese nodules? We do not believe we are. It is quite likely, also, that such a conference would extend its scope to include regulatory action affecting all known and unknown kinds of ocean mineral deposits.

In opposing steps at this time looking toward international legal and political measures regulating deep ocean mining beyond the continental shelf, we do not argue that in years to come mineral ownership of the deep ocean floor may not require international regulation. Our concern now is that such measures are premature.

We would now like to shift from our remarks concerning the deep ocean area to the areas encompassed by this continental shelf and the continental slope. We believe it may be timely for a group, such as this, to make proposals that could lead to a statement of official United States policy on interpretation of the existing international agreements pertaining to these areas.

Mankind's knowledge concerning mineral deposits on the continental shelf and continental slope is also limited. It appears probable, however, that some mineral deposits occurring in these areas will be similar to those existing on the drier parts of the continents. Some are simple extensions of land deposits. Also, in regard to these shallower water deposits, technology is rapidly advancing to a point that will permit realistic evaluation of the feasibility for economic recovery.

There has been much discussion for several years concerning the 1958 international agreement title "Convention on the Continental Shelf." We would like to stress that the words "continental shelf" in this title define and limit the subject of the convention and prescribe that the subject matter of the convention relates only to the submerged continental areas.

We believe that the legislative history of Article 1 of the Shelf Convention shows conclusively that there was intended to be an outer limit to the area of sovereign rights of coastal states to resources of the sea bed.

We also believe that the controversial words of Article 1, "or beyond that limit, to where the depth of the superjacent waters admits of the exploitation of the natural resources of the said areas," are susceptible to abuse by states desiring to extend their claims to deep ocean mineral deposits under the guise of the Shelf Convention. Such claims could also inhibit pure scientific research on the deep sea bed.

Another area of possible conflict centers on the term "exploitation." To many of us, exploitation implies a scale of operation commensurate with the market for the commodity produced, capable of competing successfully with other producers, and that the venture is profitable. Moreover, the amount of profits should be adequate considering the risks involved. But in the community of nations, a variety of views prevail. Political and geopolitical considerations may

overshadow other factors in reaching investment decisions. Profits may not be considered, or, if so, they might be measured differently. The question is: For a nation to extend its continental shelf sovereignty through exploitation, is limited technology alone necessary, or is an inherently successful unsubsidized and profitable commercial endeavor required?

It seems to us that no part of the Geneva Conventions on the Law of the Sea has been more misunderstood by the general oceanographic community than this matter of the width of the legal continental shelf.

At the present time the most logical and clearly defensible view is that exemplified by the resolution drafted by the Committee on the Law of the Sea of the Section on International Comparative Law of the American Bar Association last year. This Committee on the Law of the Sea urged "that prior to framing any policy vis-à-vis other nations with respect to sea resources not covered by existing law, the United States Government be urged to review thoroughly the issues at stake in consultation with representatives of this Association competent in the field of international law, with scientific and technical experts, and with leaders of American industry interested in oceanic development."

As an assistance to our government at such times as these issues become increasingly urgent, perhaps the American Bar Association through its appropriate Section and Committee could draft the best possible scholarly interpretation of Article 1 of the Shelf Convention with particular reference to where sovereignty over the minerals on the shelf ends and where free and unallocated minerals of the deep ocean bottom begins. This would clarify where we actually stand legally, and with advances in technology we may clarify where we stand factually with reference to the habitat of the ocean deep.

In making this suggestion, we anticipate that in years to come mineral ownership of the deep ocean floor may require international regulation. This, however, should be done with deliberate full knowledge of the scientific facts and clearest possible exposition of existing treaty law, not in an intellectually dishonest manner by subtle and devious extension of jurisdiction beyond the legal continental shelf agreed to by the 1958 Convention.

"SUBMARINE ZONES OF SPECIAL JURISDICTION"[1] UNDER THE HIGH SEAS-- SOME MILITARY ASPECTS

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I; Introduction

(1) The Place of this Paper in the Author's Blueprint for an International Regime of the Oceans

At the outset I wish to offer a definition and make two preliminary points. Following the position I took in my earlier study, "Special Regimes and Pre-emptive Activities in International Law,"[2] I propose that the word "regime" be used to indicate:

> A system of rules operating within a given legal framework or with respect to a stipulated group of related objects to allocate effective rights and resolve conflicting claims on the basis of common values.[3]

To this definition I should add the observation that within the regime governing the allocation and evidencing of submarine zones of special jurisdiction I propose to discuss there are systems of priorities between types of envisaged uses (and especially military uses) of the sea. So much for the definition.

The first of my two preliminary points is that I have not changed my position from that put forward in the paper I gave at last year's Annual Summer Conference of the Institute regarding the terms of the treaty regime and the principles for reconciling conflicting uses of the seabed and subsoil of the oceans beyond the continental shelf I proposed therein.[4] (My proposal regarding the continental shelf was that this region should still be governed by the

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[1] This writer first used this term to designate the areas of the seabed and subsoil beyond the continental shelves of the coastal states and under the high seas wherein states could guarantee exclusive rights to exploit resources and ensure secure titles. See Goldie, et al., "A Symposium on the Geneva Conventions and the Need for Future Modification," The Law of the Sea: Offshore Boundaries and Zones, ed. Lewis M. Alexander (Columbus, Ohio: Ohio State University Press, 1967), 265, 281-85 [hereinafter cited as "Goldie, 'Geneva Conventions'"]. For a very brief outline of the proposals made in that study for an international treaty regime regulating the allocation of Submarine Zones of Special Jurisdiction among states and providing for the evidences, recognition and reception of titles and transactions derived therefrom see, infra §§ III(1) and (2).

[2] 11 Int'l. & Comp. L.Q. 670 (1962).

[3] An example of such a regime (in terms of the then emerging Continental Shelf Doctrine) is to be found in Gidel, Le Plateau Continental (Opening Address at the Fourth Annual Conference of the International Bar Association, July, 1952), transl. as The Continental Shelf, 3 U.W. Austl. Ann. L. Rev. 87, 102-3 (Goldie transl. 1954). It is as follows:

> "This much seems certain: Of those states which have claimed similar rights (although in many instances the claims lack that exact similarity which is a condition precedent to their recognition as a common rule), each has unilaterally expressed an intention in substantial conformity with that expressed by the others; thereafter it cannot venire contra factum proprium, it is estopped from denying to others rights similar to those which it has claimed for itself. Because in this way there has been formed a reciprocal system which has already acquired considerable importance it may be said that a regime of the continental shelf has come into being. But is that regime equivalent to a precept of customary international law capable of operating as a general category for every unilateral expression of intention of the same nature and therefore able to make such expressions of intention effective erga omnes?"

This writer (in Goldie, "Special Regimes and Pre-Emptive Activities in International Law," 11 Int'l. & Comp. L.Q. 670, 698 (1962)), without attempting to exhaust the categories, distinguished the following types of regimes (of which that indicated by Professor Gidel in the foregoing quotation is one--the second):

> "(1) The acceptance, amongst a group of states, of a community of laws and of legal ideas--for which Travers v. Holley and the cases following it provide an eloquent example; (2) the mutual respect and recognition accorded by certain states to the unilateral policies of others acting in substantial conformity with their own, enmeshing all the states concerned in a regime with respect to those policies; (3) a common loyalty, among a group of states, to the principle of abstention regarding a common resource when this is mutually and equitably administered in the light of scientific knowledge, the participation of these states within a regime of this kind most clearly illustrates the possibility of restraining pre-emptive acts which might otherwise be permitted under general international law."

[4] Goldie, "Geneva Conventions," 281-85. See also infra, § III(1).

Convention on the Continental Shelf, Geneva, 1958,[5] with one amendment--the elimination of the exploitability test in Article 1.) Secondly, following the definition just given, I view the term "regime" as applying, in the context of this study, to the legal rules and doctrines governing and reconciling possible alternative and even potentially conflicting uses, interests, and activities. Hence I cannot accept a view that each use, economic, military, and scientific, necessarily must have its own regime--as would seem implicit in the choice of this panel's title and the allocation of individual topics. Indeed, such a theory of separate and alternative regimes would be an invitation to anarchy. My second point is concerned to clarify assumptions which the use of the phrase "alternative regimes" (and especially, within that wider formula the more restricting term "alternatives for military use") would appear to suggest regarding the effect of the outbreak of war upon a regime governing alternative or conflicting uses of the oceans. This paper will not be centrally concerned with the impact of war on the legal regime I suggested here last year and will indicate in later paragraphs.

(a) Can there be an "Alternative Regime" for "Military Use"?

My own proposals for the emerging rules and doctrines of the sea, if the oceans are to be rationally used, remain that the governing regimes should not be "alternative" to one another, but should reconcile alternative uses. There should be one embracing regime regulating each major economic and juridical division of the high seas: thus there should be one for the continental shelf, another for the resources of the seabed and subsoil of the deep oceans, one for the living resources of the volume of the waters, and another regulating transoceanic and maritime seaborne and airborne traffic. The proposal I put forward in the paper I gave here last year for a regime ordering the distribution and recognition of rights over the resources of the seabed and subsoil of the oceans, may, perhaps, offer merely one of a number of possibilities. But whatever the form of the international regime which does emerge, it should be one directed to bringing about the maximum use of available resources for the general benefit in order to achieve equitable allocations of the oceans' resources. The regime I suggested last year not only offered a blueprint, it also provided the modalities of the transition from the present primitive and inadequate regime to one which was proposed as more completely responding to the present-day needs of the world.

(b) Military Uses--War or Peace?

The premise of this present paper, let me repeat, is that the regime discussed in the pages which follow is relevant to peaceful relations--not warlike ones. Or, if relevant to the conduct of a limited war or a civil war, the regime discussed in the pages which follow is outside the conduct of hostilities and of actual military or naval operations. If the war is less than an unlimited one, then only those activities which are within the zone, the acceptable means, and the scene of the combat will be affected. But if the war is unlimited, then relations defined in terms of a peaceful regime will be changed into relations determined by the exigencies, and the dimensions, of total war. For unlimited war throws down a great landmark[6] in international law whereby all legal relations are changed to the extent that they fall within the scope of the conduct of hostilities. In modern terms the issue of whether a legal relation has been translated from the dimension of peace to that of war may well depend on whether an escalation of hostilities

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[5] Done April 29, 1958, [1964] 1 U.S.T. 471, T.I.A.S. No. 5578, 499 U.N.T.S. 311.

[6] This writer has, in his book review of V. Sokolovskii, Soviet Military Strategy (H. Dinerstein, L. Goure and T. Wolfe transl. 1963), 36 S. Cal. L. Rev. 629, 633 (1963) [hereinafter cited as "Goldie, 'Sokolovskii'"] criticised Kinglake's use of the "outbreak of hostilities as 'throwing down the great landmark between peace and war,' and signifying an absolute change in relations" (footnotes omitted) in the following terms (id. n. 20):

> "This may express the thoughts of the closet and the study; but it does not reflect British military practice in that century, when Britain was continuously enforcing her authority in contests and wars of all sizes and degrees of commitment (from battle victories over Russia in the Crimean War in 1854-56--Russia was then regarded as the first military power in Europe--to tribal skirmishes in Asia and Africa, and to the conduct of the Great Game in the Caucasus and Central Asia)."

This writer must now add a qualification to this observation. Insofar as hostilities, even in a limited war, so affect relations, that war does become a landmark in the law, not absolutely, but relatively as I with regard to its transforming effect on those relations. Secondly, unlimited, or "absolute" warfare, unforeseen in von Clausewitz's time, now does throw down "the great landmark" Kinglake mentioned, for:

> "The word 'absolute' here is used to indicate that it is now possible to wage absolute war, i.e., a war which need not be limited by Clausewitz's three modifying factors, but can 'spring up quite suddenly and spread to the full in a moment,' consist of 'a single absolute blow,' and impose irreparable harm upon the enemy, a harm in absolute terms in that it is one from which he may never recover. Such a blow is not 'a passing evil.' See inter alia 3 Von Clausewitz 79-83 (Book VIII, Chapter 2, 'Absolute and Real War')."

See Goldie, "Sokolovskii" 636 n. 34: The reference to Von Clausewitz in the above citation refers to Von Clausewitz, On War (Graham transl. 1949), see Goldie, "Sokolovskii" 633 n. 19. Thus today it becomes possible to speak of hostilities as providing legal landmarks--but in a sense different from Kinglake's--and under the following circumstances:

(1) Relatively, and when specific relations are affected and transformed in the conduct of a limited war; and
(2) Absolutely, when "absolute war"--now a military possibility the intellectual implications of which should not be shirked--defines the totality of relations between the contesting states or blocs.

includes, either by reason of their location or their category, activities which, without their being caught within the net of warfare, would remain within the regime proposed in this study. For example, while two states wage a limited war on each other on dry land, their fixed submarine bases, installation and depots may well fall within a regime governing peaceful relations. In such a situation these "sanctuaries" would be respected by the very nations which are waging war in other theatres.

(2) The Place of the Regime in International Law

Traditionally the international law of peace distinguished between two categories of seas: those under sovereignty of the coastal state by reason of a number of labels--territorial waters, internal waters, historic waters; and those beyond the sovereignty of any state--the "free high seas," these being viewed as res extra commercium whether as res nullius or as res omnium communis. In recent years some novel doctrines have been developed for the affirmance of coastal states' claims to extend their exclusive authority further and further out from their coasts and into the maritime areas which formerly were characterized as "free high seas." Although these many doctrines pay lip-service to the freedom of the seas, like the older formulations of territorial and internal waters, they fall within the general category of exclusive rather than shared claims to use a resource or to exercise a jurisdiction. These contemporary variations on the older theme of exclusivity include: contiguous zones, zones of specialized jurisdiction, the continental shelf doctrine, and conservation zones. All these resemble the older concept of territorial and internal waters in that the rights they justify arise from the unilateral action of the coastal state and are exclusively expressed by that state. Though guided by the ideal of "progressive development" as well as faithful to the task of codification, the Geneva Conventions on the Law of the Sea, and their attendant Resolutions and Protocol, did little more than cast the traditional pattern of the international law of the sea into an authoritative form, consecrate several emerging doctrines (for example, that of the continental shelf) as existing law, and introduce some specific and therefore limited reforms. The Conference did not, however, effectively temper the basic pattern of the regime of the world's oceans.

This general customary regime has been modified, with respect to a number of resources, and especially various species of fashionably edible fish, by treaty regimes (some bilateral, others multilateral) establishing regional fishery authorities which conduct research and exercise independent regulatory powers over access to the fishery in terms of conservation and exploitation claims. But even when due account is made of these treaty regimes, the traditional, conceptualistic approach still holds sway over the general study and application of the discipline called international law of the sea. This is true, not only of those areas where treaty regimes have failed to replace the traditional order, but even in the negotiations for and interpretation of the existing treaty regimes. Invocation of the traditional concepts only too often provides the rhetoric for asserting claims to be incorporated into the treaty's provisions. Also international lawyers show a marked propensity, when confronted by the task of interpreting the terms of an existing treaty, to put forward, or to accept, the construction most congruent with traditional doctrines.

As world population increases, so mankind is looking more and more to the seas to supply natural resources of all kinds as these diminish on land in the face of an ever-increasing demand. The oceans offer us a great variety and multitude of mineral and organic resources, some of which have only come within the scope of our understanding and use in recent years, or even months. The traditional and still-existing rules which govern the international law of the sea have become completely inadequate to give a secure basis for winning all the resources of the sea--those which have long been known and available equally with those which are newly discovered and exploited. This observation is particularly cogent in connection with the more newly-known and exploitable resources. The economics of winning these call for great outlays of capital, skill, and time. But, as international law stands at present, such investments may be placed in jeopardy since, beyond the territorial seas of the coastal states, and outside their continental shelves, the primitive Law of Capture provides the sole muniments of title to the hard-won riches of the seas. Such a legal rule as this provides no adequate security of title once a coastal state's zones of jurisdiction have been left behind. In addition, it renders investment in mineral-winning activities in the deep oceans unnecessarily risky and unattractive to lenders, investors, and entrepreneurs--thereby reducing if not nullifying the incentives for engaging in these activities. When the technology, knowledge, capital and desire to engage in an activity are all present, and when that activity would be for the benefit of mankind, it seems absurd that only the state of the law should, through the ineptitude and primitiveness of the applicable legal doctrines, stand in the way of successfully pursuing that activity. Hence there is a pressing need to develop legal concepts and doctrines to secure transactions, equitably allocate the benefits derived from placing the oceans' resources at the disposal of mankind, and ensure that inconsistent uses of the high seas do not lead to conflicts not amendable to juridical formulation and resolution. The general regime I provisionally offered in a preliminary form in my paper last year is intended to bring about the type of legal change so needed today in the international law of the sea.

II. SOME IMAGINARY MILITARY SYSTEMS INDICATING PRESSURE FOR LEGAL CHANGE

Reading some of the technical journals has induced me to engage in some science-fiction speculation, and, on the premise that some aspects of the systems I am going to outline may, perhaps, feasibly form part of a nation's future defense arsenal, I shall propose the sort of legal regime which claims for the protection and integrity of such imagined systems and installations will logically call for. Most of the military hardware and establishments envisaged

in the following paragraphs are based on articles and papers in recent issues of Geo-Marine Technology and Oceanology International, and the papers reproduced in The New Trust Seaward.[7]

(1) Submarine Pens and Forts

In the near future, when men have learnt to establish semi-permanent dwellings under the sea, naval authorities will see the need to establish permanent fixed submarine maintenance facilities, research and communications stations, storage depots and repair works (miniature submarine San Diegos, Gibraltars, Maltas, and Guantanamos). These could be built on the seabed or in the subsoil; or could float suspended at various depths below the surface of the sea. However constructed and placed, these installations would need protection, not only from discovery and from espionage, but also from the direct exercise of either secret or overt force.

Accordingly, some analogy of states' present-day right to "territorial integrity" should be extended to such establishments--despite the novel three-dimensional qualities of their borders. In this context there is one preliminary difficulty: under international law (and apart, possibly, from an extended and therefore potentially dangerous use of the doctrine of occupatio terrae nullius) there are no available doctrines which have been specifically fashioned for asserting territorial sovereignty over areas and volumes of submarine space, and for establishing sacrosanct national boundaries in and below the volume of the waters and beyond the geographical area of coastal states' continental shelves, territorial waters, and/or various types of protective contiguous zones. Can these permanent and fixed submarine establishments be lawfully protected? Two opposite possible solutions spring to mind. The first is to find security in existing international law. For a state may prefer to rely upon the protection which secrecy, provided by the limited effectiveness of radar and the blackness and vastness of the area and distances, both vertically and horizontally, of the ocean depths, affords--a preference which would be strongly fortified when secrecy is reinforced by the right of self-defense in the event of a threatened attack. On the other hand, states relying on this combination of secrecy and self-defense expose themselves to a major risk; namely that their installation may be discovered by vessels exercising the freedom of the seas, and hence immune from legitimate reprisals. An alternative possible solution would be to bring submarine installations within a treaty regime which, on an analogy with Article 82 of the United Nations Charter, recognizes "strategic areas" from which unauthorized persons, vessels and systems can be excluded under international law, and wherein the doctrine of the freedom of the seas would have no place. A state may not, however, seek to obtain the advantages of both types of regime. It must choose between them.

(2) Fixed or "Hardened" Submarine Rocket Sites

Similar problems apply to fixed or "hardened" submarine rocket installations as have already been discussed in connection with submarine naval bases, work shops, supply depots and establishments. Here, too, a state may rely on either secrecy or the treaty regime which has just been indicated.

(3) Polaris Submarines, Deep Diving Systems and Mobile Naval Research Laboratories

The units indicated in this heading include the many types of submarines, deep submersibles and surface vessels which have recently been, or are now being, developed. Since mobility is their keynote, there would appear to be little need to extend the suggested treaty regime to these craft. Unlike the units I have just discussed, general international law and the 1958 Geneva Convention on the High Seas would provide these mobile units with an adequate regime during peacetime--subject to the eventual possibility, should these types of vehicles become very common, to agreements establishing "rules of the road" and perhaps, to similar arrangements as those which today govern major international air routes.

(4) Submarine Hunting Systems

Secrecy and surprise, as well as the nuclear warhead of its weapons, provide the Polaris submarine with its awesome authority. This submarine warship's invulnerability depends on the difficulty, at the present state of the art, of finding it and keeping track of it--a function equally of the present-day inability of radar to operate effectively under water and of the short range of sonar and the slow travelling speed of its signals. On the other hand, a perusal of the current and recent issues of such periodicals as Geo-Marine Technology and Oceanology International show the many types of equipment which could be combined, with a little imagination, to limit the Polaris submarine's authority by ending its capability of surprise. One such combination has already been publicly proposed for peaceful uses--namely, General Dynamic's proposal for a "World Weather Watch" system. This is, briefly, to add to the present-day meteorological system of land stations supplemented by measurements in the upper atmosphere and the reports of the weather satellites, a world-wide network of giant data-collecting ocean buoys. The data which these buoys could collect, it is suggested, could be instantaneously relayed to central positions by communications satellites. Why should such a

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[7] Transactions of the Third Annual MTS Conference and Exhibit, 5-7 June, 1967, San Diego, California (1967). The papers especially relied on are:

(a) C. Majkrzak and M. Polgar, "Energy Converter for Unattended Data-Collecting Buoys," id. 277;
(b) J. Harter, "Advanced Gas Handling Techniques as an Aid to Saturation Diving," id. 337;
(c) A. Kramberg, "Saturation Diving: Vertical Excursion Techniques," id. 345;
(d) C. Brancart and G. Hoffman, "Star II A Second Generation Research Submarine," id. 459;
(e) P. Eliot, "The Design and Construction of Deepstar 2000," id. 479;
(f) L. Wasserman, "Feasibility Evaluation of a Moored Oceanographic Buoy-Satellite Data Relay System," id. 517;
(g) C. Beckner, "An Infrared Detecting Set," id. 533;
(h) K. Perry and D. Smith, "A New Set of Modules for Oceanographic and Marine Meteorological Instruments, Instrument Systems and Associated Data Processing," id. 571.

And see Appendix I attached hereto.

system not be adapted to submarine watching? For if the buoys were in close enough proximity they could utilize sonar, for that system of detection's great weakness, slowness and short range of signals, would no longer be a critical limitation to watching submarines, even such high-speed, nuclear-powered submarines, as those mounting the Polaris missile.

What sort of a legal regime would be most apt for such a defensive system? My suggestion is that a "World Submarine Watch" system should be established and should be characterized in law as an "international easement" to be owned and controlled by a supranational agency whose members could include not only the contributing states, but also the Secretary General of the United Nations and any disarmament inspection agencies which might be established in the future. (A similar status--with suitable variations--could be developed for an internationalized and universal "World Weather Watch" system, to the advantage and prosperity of the whole world.) If the "free for all" alternative were allowed there would be the potential wastage and confusion resulting from a number of countries establishing their own "World Submarine Watches." Here as in so many developing frontiers of international law, the danger of conflict would appear to threaten not only from inconsistent uses but also from overcrowding of facilities directed towards the same, or parallel uses.

III: DEEP OCEAN MINING AND MILITARY USES

(1) Legal Relations within the Draft Convention (or Articles)

My basic proposals regarding this group of uses of the seabed and subsoil remain unchanged from last year. My position still is that legal analogies may fruitfully and appropriately be drawn from the provisions and institutions of the International Telecommunications (ITU) Convention[8] for allocating to states specific areas of the seabed and subsoil, to be designated Submarine Zones of Special Jurisdiction, and that military activities should not fall within a distinct regime from that adumbrated in the Draft Convention (or Draft Articles) on the Resources of the Seabed and Subsoil I proposed in my paper last July.[9]

An outline of the general contours and qualities of such a regime might well be briefly indicated at this point. First, my proposal puts forward procedures for allocating and evidencing states' Submarine Zones of Special Jurisdiction for winning mineral resources from the seabed and subsoil of the deep oceans beyond states' territorial waters and continental shelves (the continental shelf being defined in terms of depth--i.e., two hundred meters--only). Second, the suggested regime provides principles for the transnational[10] recognition and reception of valid and marketable titles to those resources. This second group of principles both outlines the terms, and the means of development, of an

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[8](Geneva Revision) done December 11, 1959, [1961] 2 U.S.T. 1761, T.I.A.S. No. 4892.

[9]This treaty regime could equally well be established by adding new articles to the Geneva Convention on the High Seas, or, alternatively, by means of a fifth Convention on the Law of the Sea, possibly to be named the "Convention on the Resources of the Seabed and Subsoil of the High Seas." On the other hand, to add these proposed articles to the Continental Shelf Convention could be very misleading. Despite the fact that they also offer procedures for exercising sovereign rights in submarine areas, and create thereby means of securing titles to resources won from the seabed and subsoil of the oceans, the recognition of claims, the allocation of authority, and the procedures suggested in this writer's proposals operate on the basis of quite different principles from those set forth in the Geneva Convention on the Continental Shelf. To place these two sets of operating rules in the same Convention could, therefore, create confusion--especially in matters of interpretation.

[10]"Transnational" is a most useful adjective, and one made popular by Judge Jessup in his book Transnational Law (1956) to indicate legal relations (and factual situations) not adequately covered by any other word. He defines the term id. at 2, as follows:

> "...I shall use, instead of 'international law,' the term 'transnational law' to include all law which regulates actions or events that transcend national frontiers. Both public and private international law are included, as are other rules which do not wholly fit into such standard categories." (Footnotes omitted.)

Judge Jessup appended a n.3 to this quotation which is as follows:

> "Myres McDougal has familiarized us with the use of the adjective 'transnational' to describe groups whose composition or activities transcend national frontiers, but he does not apply the term to law in the sense in which it is used here. Joseph E. Johnson suggested more broadly the utility of the word 'transnational' in place of 'international' in his address of June 15, 1955, at the annual meeting of the Harvard Foundation and Law School Alumni. Occasional use of the word has also been made by ..Corbett, The Study of International Law 50 (...1955), and by...Nussbaum, A Concise History of the Law of Nations (rev. ed....1934)."

"Transnationally valid and marketable titles" may, hence, be defined as those titles which depend, for their validity, upon a regime transcending domestic law--even though their effectiveness is dependent upon their recognition and reception in domestic tribunals and as an adjunct of domestic property law.

international (or, better, transnational) regime of recognition--of "Full Faith and Credit"--to be accorded by the authorities of all states who are parties to the regime to titles allocated by each state and pertaining to resources won from the bed and subsoil of the deep oceans. To be more explicit: my intention was to set out the principles of a regime governing the assurances of titles created under the municipal law of each state, by the recognition of those titles in the courts of all the others through an international agreement, and by means of establishing, under public international treaty law, conflict of laws standards and obligations of recognition.

By means of establishing a regime of this kind certain areas whose resources might otherwise subject them to conflicting multiple uses, or to over-use, would be preserved from becoming arenas of intractable disputes. While negotiation and agreement could effectively achieve an acceptable distribution of the Submarine Zones of Special Jurisdiction, requiring the delicate task of allocating mineral-bearing submarine areas to remain within the scope of Plenipotentiary Conferences, the recordation of rights already established could, and should, be left to an appropriate administrative agency. Hence, central to that study was the proposal that regional agencies with, necessarily, a central index in the United Nations Secretariat should be established to carry out evidentiary and recording functions. (These agencies would have no authority to grant titles.) The primary function of such institutions would be to ensure that the whole world had effective notice of the existence, area and content of recorded rights. With regard to defense activities I suggested a third set of principles. I took, as my starting point, the strategic provisions of Article 82 of the United Nations Charter as an analogy. By virtue of those proposals states seeking to establish fixed defense installations on sea mounts and on the seabed should give notice to the effect that such areas have been taken for defense purposes and are not to be viewed as being any longer under the general international law rules governing the seabed and its subsoil. Upon such an announcement the asserting state may, further, establish "security zones" around its strategic areas. The jurisdiction asserted would be analogous to that claimed in the Australian Defense (Special Undertakings) Act of 1952[11] (proclaiming the Porto Bello Islands to be a "prohibited area" for the conduct of atomic bomb tests), rather than that published by the United States and the Soviet Union in their nuclear weapon testing areas on the high seas. (These countries merely issued Notices to Mariners.[12]) On the other hand, the proclamations of defense areas should be accompanied by Notices to Mariners; but these notices would be merely evidence of the privileges asserted, not the means creating those privileges. Naval submarines would not, of course, fall within this regime. They will have to take their chances, as heretofore, as they clandestinely move about under the cover of the seas.

(2) Legal Relations Outside the Draft Convention (or Articles)

In concluding I would like to add the observation that individuals, corporations and, indeed, states should be perfectly free to invoke, or not to invoke, at their discretion, the foregoing principles. They might, conceivably, prefer to carry on a specific submarine activity outside the proposed treaty regime and in secret. Again, a state placing a higher value on secrecy with respect to a defense installation on the seabed than on the regime envisaged in the paper I gave here last year, could stay outside that regime, and rely on whatever protection general international law might allow. In such a case that state's reliance would, primarily, not be on any legal concepts, but upon secrecy and camouflage--in the widest sense. (This is, of course, the present situation under general customary international law.) Outside the proposed treaty regime a state could not demand the immunities and protection, nor the exclusive rights, which that regime could afford, any more than today the United States Navy can demand exclusive rights on the high seas when its exercises excite the curiosity of Russian "trawlers."

The exploitation of resources under the proposed treaty regime should take priority over defense carried on outside the scope of the proposed articles. Thus no Notice to Mariners, promulgated for example by the Soviet Union, would provide an effective basis for deforcing a non-Russian enterprise from working a mineral deposit with respect to which that enterprise has an internationally effective claim recorded under the proposed treaty regime. In brief, a state opting to bring a fixed submarine installation into the regime gains immunity, but at the cost of the secrecy of that installation's general location--but not, necessarily, of its exact location, nor of its characteristics. If a state prefers the shield of secrecy, it will stay outside the regime; but at the cost of immunity if the secret should be broken, or the installation discovered. Because, at least in most cases, the discoverer could invoke the freedom of the seas, the right of self-defense may well be unavailable to protect the secrecy of an installation. Here, indeed, we do have use for the phrase "alternative regimes";[13] but, one should note, here it refers to the same kinds of uses--not to "alternative uses." Because, furthermore, if alternative regimes are possible then they must be seen as co-existing. Hence a principle resolving inevitable conflicts between them is called for. Such a principle is that offered in my paper last year which gives priority to uses derived from validly recorded Submarine Zones of Special Jurisdiction over those depending on general international law.

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[11] Nov. 19, 1952.

[12] See, e.g., U. S. Navy Hydrographic Office, Notice to Mariners, Pt. II. No. 21, para. 2716 (May 23, 1953); id., No. 14, para. 1685 (April 3, 1954), and id., No. 23, para. 2932 (June 5, 1954).

[13] For a critical discussion of this term in the title to this Symposium see supra, § I(1).

IV: SCIENTIFIC RESEARCH AND THE REGIMES OF THE SEABED

(1) On the Continental Shelf

The provisions in paragraphs 1 and 8 of Article 5 of the 1958 Convention on the Continental Shelf[14] regarding free scientific research should be modified. Those paragraphs are as follows:

> "1. The exploration of the continental shelf and the exploitation of its natural resources must not result in any unjustifiable interference with navigation, fishing, or the conservation of the living resources of the sea, nor result in any interference with fundamental oceanographic or other scientific research carried out with the intention of open publication."

and;

> "8. The consent of the coastal state shall be obtained in respect of any research concerning the continental shelf and undertaken there. Nevertheless, the coastal state shall not normally withhold its consent if the request is submitted by a qualified institution with a view to purely scientific research into the physical or biological characteristics of the continental shelf, subject to the proviso that the coastal state shall have the right, if it so desires, to participate or to be represented in the research, and that in any event the results shall be published."[15]

Last year at this Institute I discussed the significance of the term "unjustifiable interference" in paragraph 1 (suggesting its kinship to the civil law concept of abus de droit). This discussion will be developed, for the purposes of this present study, in terms of the interactions of military uses and scientific research. Again, the significance of the inclusion qualifier "unjustified" in paragraph 1's formulation in terms of navigation and fishing, and the omission of that significant qualifying adjective from that paragraph's clause relating to scientific research will be reviewed in the light of paragraph 8.

The 1958 United Nations Conference on the Law of the Sea at Geneva missed the opportunity of declaring a "freedom of research, experiment and exploration"[16] as a freedom of the high seas while drafting either the Convention on the High Seas[17] (Article 2 of which enunciated a selection of such freedoms) or the Convention on the Continental Shelf. This omission is to be regretted, especially since the United Kingdom had, in 1955-56,[18] advocated such a freedom as a fifth freedom of the high seas, to be inserted in Article 2 of the International Law Commission's 1955 Draft Articles on the Regime of the High Seas (later Article 27 of the Commission's 1956 Articles Concerning the Law of the Sea[19] and, with significant changes, Article 2 of the Convention on the High Seas). Despite its [illegible]ction of men of learning and savants, the International Law Commission did not see fit to insert into any of its dra[illegible] a Continental Shelf Convention a protection of the pre-existing freedom of scientific research at the same time as [illegible] was formulating the terms of the expansion of states' authority over the seabed and subsoil of the continental shelf--thereby rendering the freedom of scientific research in that region more precarious than heretofore. The protections now in Article 5 of the Convention on the Continental Shelf,[20] limited as they are, were added at the 1958 United Nations Conference on the Law

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[14] Supra, n. 5.

[15] [1964] 1 U.S.T. 471, 473-74, T.I.A.S. No. 5578 at 3-4, 499 U.N.T.S. 311, 314, 316.

[16] Quoted from United Kingdom's Reply, U.N. Doc. A/CN.4/99/Add.1 (transmitted by a Note Verbale Dated 15 March, 1956, from the United Kingdom Delegation to the U.N.), [1956] 2 Y.B. Int'l. L. Comm'n. 80, U.N. Doc. A/CN.4/SER.A/1956/Add. 1, Sales No.: 1956 V.3, Vol. II, suggesting the addition of a fifth item to the freedom of the seas article (Article 2) of the Commission's 1955 Provisional Articles on the Regime of the High Seas, International Law Commission, "Report to the General Assembly Covering the Work of its Seventh Session," U.N. Gen. Ass. Off. Rec., 10th Sess., Supp. No. 9 at 2, 3 (A/2934) (1955), "Report of the International Law Commission to the General Assembly," [1955] 2 Y.B. Int'l. L. Comm'n. 19, 21, U.N. Doc. A/CN.4/SER.A/1955/Add. 1, Sales No.: 60. V.3, Vol. II.

[17] Done April 29, 1958, [1962] 2 U.S.T. 2312, T.I.A.S. 5200, 450 U.N.T.S. 82.

[18] See supra n. 15 and accompanying text. See also [1956] 1 Y.B. Int'l. L. Comm'n. 29-32, Sales No.: 1956.V.3, Vol. I.

[19] [1956] 2 Y.B. Int'l. L. Comm'n. 253, 259.

[20] See Appendix II to this paper for a comparative table showing the formal development of the provision protecting scientific endeavors into Article 5 of the Continental Shelf Convention.

of the Sea at Geneva, as a result of discussions in the Fourth Committee of that Conference,[21] a stylistic change in the Drafting Committee,[22] and the agreement of the 9th Plenary Meeting of the Conference.[23] Apart from noting that the Fourth Committee's deliberations point to a search for a balance between the interests of scientific research and the claims of coastal states to exercise discretionary authority and control over their contiguous and adjacent continental shelves, the travaux préparatoires are of little assistance in determining questions as to the scope of the freedom of science these clauses would appear to vouchsafe, or the effectiveness these protections would have, should they be invoked in any concrete case.

The difference in formulation in paragraph 1 between the protection to be accorded to "fundamental oceanographic or other scientific research" and that to be accorded to "navigation, fishing and the conservation of the living resources of the sea" calls for elucidation. For while the latter (the economic) group of activities are to be protected only from "unjustifiable" interference, scientific work which is intended to culminate in "open publication" appear to be protected from all interference--the qualifying adjective "unjustified" being dropped from interference with this latter class of activities. Does this mean that Article 5, paragraph 1, is mandatory, and that all forms of continental shelf exploration and exploitation activity which might, conceivably, interfere with the types of scientific research[24] falling within the clause are prohibited? Or does it merely seek to protect scientific work actually to be undertaken, or in the process of being conducted, in situ? An affirmative answer to the first question would lead to the stultification of possible future research. Clearly neither of these answers was in the contemplation of the draftsmen. Common sense tells us that although paragraph 1 is silent as to whether certain exploration and exploitation activities may set limits to the freedom of scientific research, that freedom is not altogether without those restraints which would enable exploration and exploitation activities to be reasonably carried on. To construe the paragraph as excluding all interference, even those interferences which might arise from necessity or from the claims of higher social values specifically operating in an individual context, would render the freedom of scientific research a tyrant governing all other uses of the resources of the world's continental shelves. But if exploration and exploitation activities may, in special circumstances, also justifiably interfere with scientific research, we should ask why, then, was the modifying adjective "unjustified" excluded from the description of the prohibited interferences with scientific research, but included in that of the prohibited interferences with navigation, fishing, and the conservation of the living resources of the sea? My own response to such a question would be to suggest that the answer lies in the fact that if the term "unjustified" appeared in paragraph 1 in both contexts, and without further modification with respect to the impact of the exploration and exploitation of the continental shelf upon both economic and scientific activities, then the possibility that the arguments of lawyers and judges who might seek to give the same meaning to both uses of the word "unjustified," and to develop the same criteria for the application of both--notwithstanding their greatly different contexts--would have to be faced. Thus, the submission here is that the omission of the term "unjustified" from the clause relating to the freedom of scientific research hereby indicates that the continental shelf exploration and exploitation activities which should be permitted to interfere with this freedom must be justified by entirely different criteria from those permitting interference with navigation, fishing, and the conservation of the living resources of the sea.

Paragraph 8 formulates certain duties which reciprocally bind coastal states and those individuals and institutions who engage in the scientific research activities indicated by the article; but clearly its main thrust is the protection of the "sovereign rights"--the discretionary powers--of coastal states. Hence it would appear that the only limitations on those states' authority to grant or withhold consent at will is the provision that their consent is not to be "normally" withheld. The limits for applying this important modifying adverb "normally" are not indicated. While it remains in the paragraph it provides a temptation for coastal states which may be uncertain as to the policies they should apply, or suspicious of research plans, to treat many genuine applications for the conduct of original research as outside the norm. Individual bona fide scientific projects could, when the clause is applied in this way, be diverted, modified, and even frustrated by states complying with the letter of paragraph 8. My suggestion is, therefore, that there should be, in addition to the obligations of "not normally withhold[ing].. consent" on the part of the coastal state, the provision of a positive duty of supporting, or at least of respecting, as a freedom of the seas, bona fide scientific researches carried out on the state's contiguous and adjacent shelves, and, in addition, of restraining its nationals from interfering with those researches. The paragraph should, accordingly, include positive obligations of protection and assistance, and of the recognition of a general freedom of research, experiment and exploration on the continental shelf. On the other hand, these obligations, and this freedom, should be formulated so as not to stultify the coastal state's essential requirements of survival. Nor should the freedom of scientific research be permitted to expose the coastal state helplessly to espionage. Finally, a state should, when issuing exploration or exploitation licenses with respect to its continental shelf, bear in mind their effect on existing, impending, or even planned research (when known to that state's officials) and make both non-interference with the research activity, and non-destruction (from the researchers' point of view) of its subject-matter, a condition of granting the license. In sum, these proposals are all intended to implement the consideration that exploration and exploitation policies, no less than conservation policies, should be developed which take into account the enormous value of scientific research in the development of the shelf region, and be subordinated to that activity.

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21 6 U.N. Conf. on the Law of the Sea Off. Rec. (Fourth Com.) 81-91, 119-20, U.N. Doc.A/CONF.13/42, Sales No.: 58.V.4. Vol. VI [hereinafter cited as "A/CONF.13/42"].

22 2 U.N. Conf. on the Law of the Sea Off. Rec. (Plenary Meetings) 15, U.N. Doc. A/CONF.13/38, Sales No.:58.V.4, Vol. II [hereinafter cited as "A/CONF.13/38"]. And see "First Report of the Drafting Committee Articles and Final Clauses Adopted by the Fourth Committee," (U.N. Doc. A/CONF.13/L.13) (mimeo. April 21, 1958), A/CONF.13/38 at 92-93.

23 A/CONF.13/38 at 15.

24 The question of the classes of scientific research activities which are within these protections is also open ended, compare e.g., the observations of Sorensen, A/CONF.13/42 at 82, with Schaeffer, id., at 89. See also id., 82 (Mouton), 83 (Ranukusomo), 84 (Sangkhadul) and 87 (Rouhani).

(2) Beyond the Continental Shelf

What should be the position of scientific research beyond the shelf? Here again, freedom of research, experimentation and exploration should be championed. Indeed this should be recognized as a "fifth freedom" of the regime of the high seas no less than on the continental shelf, embracing the volume of the waters as well as the seabed and subsoil of the oceans. Again, when explorations or exploitations take place in areas governed by the proposed Conventions (or Articles) on the Seabed and Subsoil of the High Seas, the exploring or exploiting entities (or individuals) should be required so to conduct their enterprises so as neither to interfere with, nor diminish the value of, any neighboring scientific activity. A right to collect damages for such interferences should be provided. Also preventive procedures should be available. Finally, an economic activity which had been recorded under the procedure to be provided in the proposed Convention (or Articles), and the state municipal laws consistent therewith, should not be carried on in any manner which might unreasonably impair the value of possible future scientific activities in the area.

The state which recorded its claim with the appropriate United Nations recording agency in accordance with the proposed Convention (or Articles) should, however, have analogous privileges and rights of participating in the scientific activity, or of sending observers, to those already recognized as enuring, by force of the Geneva Convention on the Continental Shelf, 1958, in the coastal state when a foreign country, or its citizens, engage in scientific activities on that coastal state's continental shelf. Similarly, the results of such research in the deep oceans should be published Thus the policy of Article 5, paragraph 8, together with the additional principles and the freedoms proposed in this study and aimed at protecting scientific research on the continental shelf, should, by analogy, be extended to zones in the deep oceans, whatever their depth, and wherever states have established their control and exercise their sovereign rights. Again, the conductors of scientific research in the deep oceans should be able to obtain preventive relief from unjustified interferences, and be awarded damages. These proposals regarding scientific research beyond the continental shelf should be included in the Convention (or Articles) on the Resources and Subsoil of the High Seas suggested in the paper I presented before this Institute last year.

(3) Scientific Research for Defense Purposes

At the outset we must ask ourselves whether scientific research for defense purposes is a valid special category of the type scientific research envisaged in Article 5, paragraph 1, of the 1958 Convention on the Continental Shelf and in the British proposals of freedom of scientific research as a "fifth freedom" of the high seas. There are many scientific activities which are carried out, for example, the United States Navy's "Sea-Lab," which, generally speaking, may appropriately be carried out with civilian goals equally with military, and, indeed, could be carried out by civilian research agencies and institutes. Thus, even though they are carried out by defense services, such activities neither exclude other forms of scientific research (i.e., they are not necessarily pre-emptive), nor are they so overwhelmingly relevant to defense needs that the imagination would be hard pressed to find a direct civilian or general humanitarian benefit derivable from them. Thus they may be contrasted with other types of underwater scientific experimentation which can be explained only in terms of the armed services' needs--apart from, perhaps, the sort of "spin-off" effect associated, for example, with making kitchen utensils from materials developed for rockets nose cones and the possible eventuality of using hydrogen bombs to dig inter-ocean canals one day in the future.

Subject to such limitations as not being permitted, as of right, to use the continental shelves of other states for defense research purposes, scientific research of the non-pre-emptive category, even when conducted by the defense services of a state, should be permitted to assert at least the morality of their claim in terms of the proposed "fifth freedom of the seas"--the "freedom of research, experiment and exploitation." The only reason, furthermore, why it appears to me that the defense services of one state might only with great difficulty, if at all, exercise this freedom on the continental shelf of another state, is because of the great suspicion which currently exists between nations. But need the armed services of one state be disadvantaged by the current atmosphere of suspicion when merely seeking to engage in research--provided such safeguards as the coastal state's rights to inspect and participate in the experiment, and the obligations to publish results are scrupulously respected? With the reservation I have just noted, research activities by a defense service could well be classified as falling within a similar category to civilian scientific research.

But what of those activities which are preponderantly pre-emptive in that the fact of their being carried out excludes other uses? An imaginary example may be found in a submarine experiment with an equivalent effect on the scientific community as Project Westford ("Project Needles") had in 1963[25] or a multi-megaton hydrogen device explosion to discover deep-sea effects--from underwater fall-out to submarine construction and engineering theories? I submit that such operations do not fall within the type of scientific activity for which I have been advocating freedom of research. Whether or not they result in the general protection or advancement of mankind, they are, in an immediate sense, pre-emptive and exclusionary. This point is in no wise in disagreement with the influential McDougal and Schlei study, "The Hydrogen Bomb Tests in Perspective: Lawful Measures for Security,"[26] which, so it seems to me, defended the United States 1954 hydrogen bomb tests on the basis that these, being reasonable measures for protection in a threatening environment, were not prohibited under general international law. For this is not to argue that they would, therefore, become privileged activities under the "freedom of research, experiment and exploration" advocated in this paper. Far from being a privileged activity, the 1954 hydrogen bomb tests were merely a not-prohibited one--with the actor tacitly exposing itself

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[25] Project Westford consisted of the release of fifty pounds of copper needles, each one-third the thickness of human hair, from an Atlas-Agena rocket launched from the Western Test Range. The needles were released at a height of 200 miles and in a polar orbit. The experiment was carried out by the Lincoln Laboratories of MIT.

[26] 64 Yale L.J. 648 (1955), McDougal and Associates, Studies in World Public Order 763 (1960).

to responsibility for all risks.[27] In addition, the legal responsibility of the experimenting state clearly established the right of another state exercising jurisdiction or control (or sovereign rights) in the area of the experiment to refuse permission for the experiment to take place. For, along the lines of an argument I have expressed elsewhere, a state which passively allows its territory, or territory under its jurisdiction and control (or sovereign rights), to be used as the site for such experiments may, on an analogy with the Corfu Channel Case,[28] be viewed as jointly liable with the actively experimenting state--despite its complete passivity.[29] In brief, my proposal is that experiments of this kind should be viewed as being permitted only; provided that they do not come into conflict with the stronger claims of the fifth freedom of the seas. Rather, if such an experiment is planned to be carried out in a maritime zone under the jurisdiction of another state, that state may interdict the activity, and secondly, if any loss of life, or injury to person or property should result, then the state undertaking the experiment should be absolutely liable[30] for all harms ascribable, by application of the concept of "channelling,"[31] to the experiment and to the state conducting it.

(4) An Exception--Defense Installations

In connection with the fixed defense installations under the sea there are two possibilities. First, if the area has been "dedicated" or recorded for defense purposes under the treaty regime outlined in my offering last year to this Institute,[32] then the state establishing the defense installation should be entitled on, perhaps, a somewhat extended analogy with Article 82 of the United Nations Charter (the "strategic areas" provision in Chapter XII, the "International Trusteeship System"--the principles embodied in Article 83 are not relevant to the problem of this article), to proclaim the area as a zone to be used solely for defense purposes. The effect of such a proclamation would be to take the proclaimed area outside the proposed Articles (or Convention) on the Seabed and Subsoil of the High Seas[33]--including those according privileges and immunities to scientific research. As with the other proposed Articles regarding defense installations on the seabed, these defense areas provisions are not intended to be relevant to submarines in motion. They would, however, be relevant to submarine pens on the seabed.

The second possibility occurs when a state establishing a fixed submarine defense system (as indicated in Section II, paragraphs (1) and (2) above) does not bring it within the proposed regime. That state is, in effect, choosing to rely on secrecy and is risking the possibility of discovery--including a surprise discovery by a scientific expedition--as the cost of that secrecy. Should scientific research develop in the area, the claims of a state relying on secrecy and the regime provided by traditional international law rather than on the treaty regime should be subordinated to priorities and claims favoring research--and the treaty regime. Furthermore, any violent interference with a peaceful scientific expedition for the purpose of preserving military secrecy on and under the high seas should be designated an act of aggression; for a state has a choice between the immunities provided by the proposed Convention (or Articles),[34] as a matter of law, and the protections which physical conditions may provide by secrecy. But these are distinct protections and the attendant benefits of each are different. In choosing the one or the other the electing state balances its conveniences. It must, however, choose, it cannot have the advantage of both regimes, nor can it escape the limitations of either.

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[27] See infra., nn. 29-31 and the accompanying text.

[28] [1949] I.C.J. 4.

[29] See Goldie, "Liability for Damage and the Progressive Development of International Law," 14 Int'l. & Comp. L.Q. 1189, 1250-54 (1965) [hereinafter cited as "Goldie, 'Liability for Damage'"]; "Comments," Brit. Inst. Int'l. & Comp. L., Current Problems in Space Law, A Symposium 49, 62-63 (Brit. Inst. Int'l. & Comp. L. Int'l. L. Series No. 6, 1966) [hereinafter cited as "Goldie, 'Comments'"].

[30] For the suggestion of a more exact use of the term "absolute liability" (and its grammatical variants) than is currently in use see Goldie, "Liability for Damage," 1215-18, 1241-46, 1248-49, 1262-64, and Goldie, "Comment," 55-57.

[31] This term was developed in the context of international treaties on liability for damage arising out of civilian uses of nuclear energy to denote the tracing of responsibility for nuclear injuries back to an operator of a nuclear ship, reactor, etc., notwithstanding the length of the causal chain or the novelty of any intervening acts--except the willful acts of a claimant. See, for a discussion of these treaties, and of the concept of channelling, Goldie, "Liability for Damage," 1216-17 (and especially nn. 104-10 and the accompanying text), and 1241-44, and Goldie, "Comment," 55-57 (and especially nn. 19-23 and the accompanying text).

[32] See Goldie, "Geneva Conventions," 283-84.

[33] I.e., the proposed Articles (or Convention) outlined in Goldie, "Geneva Conventions," 281-85; and see this study, supra., § III(1).

[34] I.e., the proposed Articles (or Convention) indicated in § III(1) above.

V: CONCLUSION

To return to the introductory points made at the outset of this study, clearly when peace reigns it is inappropriate to discuss the military, scientific and economic uses of the seas as calling for different regimes. These uses will co-exist within the regime existing for the reconciliation of their competing needs. Alternative regimes, even in time of peace, there may be, but these are the alternative regimes of the present general, customary international regime and the treaty regime proposed in my presentation to this Conference last year.[35] Again, the conduct of hostilities transforms legal relations to the extent that the context reaches and affects the human activities concerned. Unless the opposed states permit the great landmark of absolute war[36] to define the whole range of their relations, or unless limited hostilities affect and translate specific relations into one of the possible alternative dimensions of war,[37] military uses do not provide, and are not able to provide, their own "alternative regime." But, one may well ask, does the transformation of the environment of a relationship or of an activity from that of peace to that of war create "alternative regime for military uses"? Used in this sense the meaning and context of the term "military uses" has been radically changed. It has come to indicate, not a military regime, but a dimension within which regimes operate.

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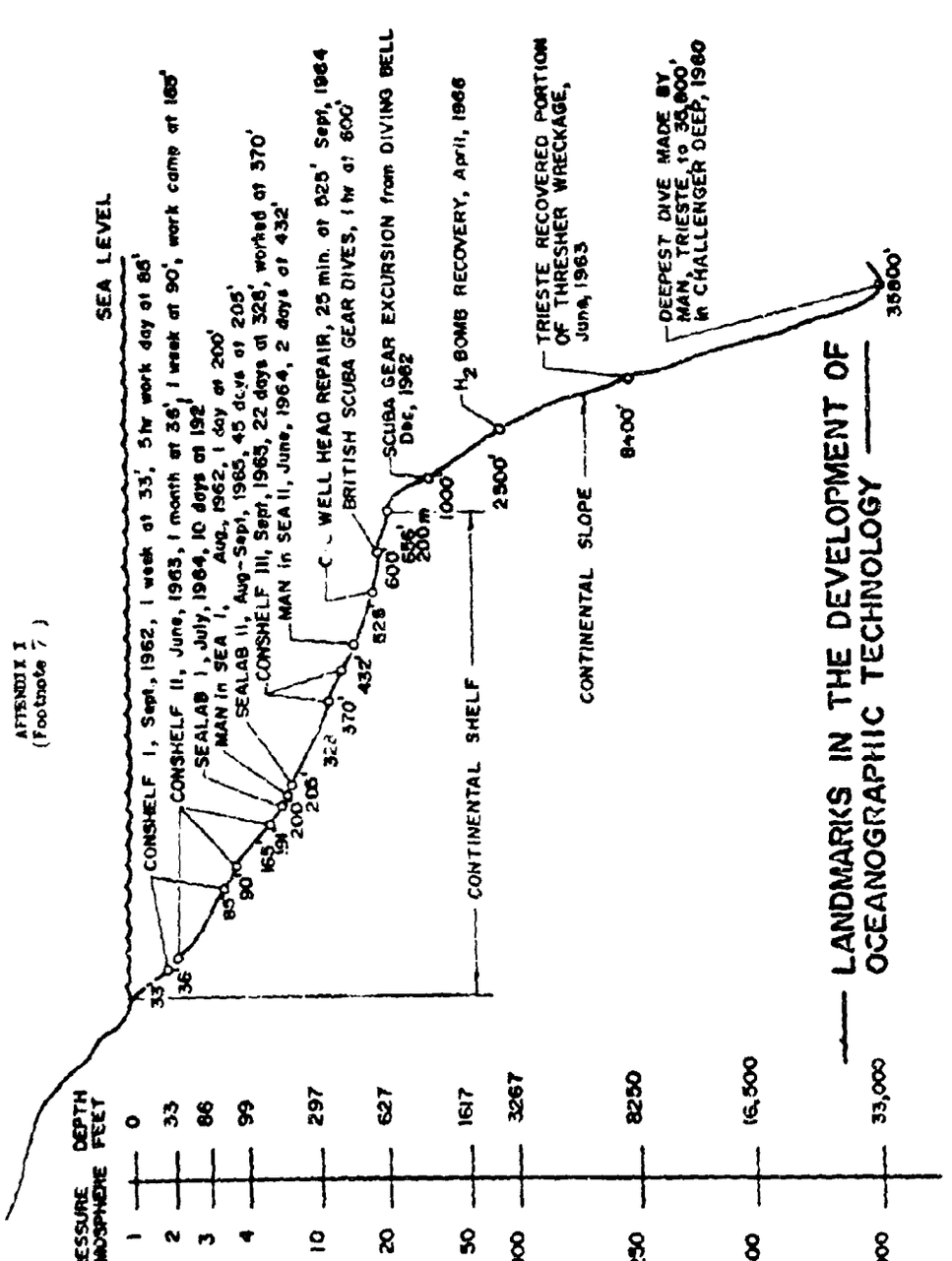
[35] Supra, n. 1.

[36] See supra, n. 6 for a discussion of this concept as used in this study.

[37] Supra, n. 6.

APPENDIX I
(Footnote 7)



APPENDIX II
(Footnote 20)

Comparative Table of the provisions relevant to freedom of scientific enquiry in the International Law Commission's 1951, 1953 and 1956 Drafts and in the Convention on the Continental Shelf, Geneva, 1958.

Article 6	Article 6	Article 71	Article 5
1. The exploration of the continental shelf and the exploitation of its natural resources must not result in substantial interference with navigation or fishing. Due notice must be given of any installation constructed, and due means of warning of the presence of such installations must be maintained.	1. The exploration of the continental shelf and the exploitation of its natural resources must not result in any unjustifiable interferences with navigation, fishing or fish production.	1. The exploration of the continental shelf and the exploitation of its natural resources must not result in any unjustifiable interference with navigation, fishing or the conservation of the living resources of the sea.	1. The exploration of the continental shelf and the exploitation of its natural resources must not result in any unjustifiable interference with navigation, fishing or the conservation of the living resources of the sea, nor result in any interference with fundamental oceanographic or other scientific research carried out with the intention of open publication. . . . . 8. The consent of the coastal state shall be obtained in respect of any research concerning the continental shelf and undertaken there. Nevertheless, the coastal state shall not normally withhold its consent if the request is submitted by a qualified institution with a view to purely scientific research into the physical or biological characteristics of the continental shelf, subject to the proviso that the coastal state shall have the right, if it so desires, to participate or to be represented in the research, and that in any event the results shall be published.

THE CHANGING LAW OF THE SEA - EFFECTS ON FREEDOM OF SCIENTIFIC INVESTIGATION

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Introduction

The rapidly growing human population of this planet, with constantly improving standards of living, demands natural resources at an ever increasing rate. To satisfy this burgeoning demand most, if not all, nations are turning to the sea to satisfy an increasing share of their requirements. The rapid acceleration of the exploitation of the sea has been made possible by technological developments, based on intensified scientific inquiry, and this trend may be expected to continue. This accelerating use of the sea's resources has led to changes in the institutions and legal regimes for the sharing of the resources among nations, and in some instances for their joint management. It is evident that, in the process, there has been, and will doubtless continue to be, extension of national jurisdictions over increasingly large regions. It is the thesis of this paper that this extension of national jurisdictions tends to diminish the possibility of exercising the right of conducting fundamental scientific research, which is an indispensable basis of the rapid and effective development of the technology required for the use of the sea's resources for the benefit of all men; that the present arrangements for the conduct of fundamental scientific research in areas under national jurisdictions are unsatisfactory; and that, therefore, there is a need to establish additional means of facilitating such research. It is urged that the United States take the lead in developing new arrangements.

Demands and Capabilities for Using the Resources of the Sea

The driving forces behind the recent acceleration of the use of the ocean that, in turn, has put so much pressure on the law of the sea, are of two kinds. First, is the requirement for the resources which the sea offers, for the raw materials which we can obtain from it, as well as other uses such as transportation, recreation, waste disposal and military defense. These needs, and the ability of the sea to satisfy them, are well-known and have been widely discussed.[1] The companion force is the development of new technology making possible the utilization of these resources of the sea. This technology was given great impetus by scientific and engineering endeavors related to military problems during the war, and has accelerated since under the thrust of academic and industrial science and engineering related to non-military opportunities. The nature of these scientific and technological developments, and their effects on the processes whereby the international law of the sea is elaborated, have been recently discussed in some detail by Professor William Burke.[2]

Recent Expansion of National Jurisdictions

The pressure of these forces resulted in explicit action in 1945 with respect to those resources most obviously affected by rapid scientific and technological development, that is, with respect to the resources of the continental shelf, where it had become evident that extension of technology to the sea would make profitable the exploitation of valuable petroleum and other mineral resources, and with respect to the fisheries, which have been a matter of contention among nations for centuries. On September 28, 1945, Presidential Proclamation No. 2667 asserted unilateral jurisdiction and control over the natural resources of the seabed and subsoil of the continental shelf beneath the high seas but contiguous to the coast of the United States, while, at the same time, asserting that the character as high seas of the waters above the continental shelf and the right to their free and unimpeded navigation are in no way affected. Presidential Proclamation No. 2668 of the same date asserted a policy respecting coastal fisheries in certain areas of high seas. There would be established conservation zones in such areas wherein fishing activities have been, or in the future may be, developed and maintained on a substantial scale; where the activities are developed and maintained by nationals of the United States alone, the United States would establish conservation zones subject to regulation and control of the United States. Where such activities have been, or may later be, developed and maintained jointly by nationals of the United States and nationals of other states, conservation zones would be established by agreement among such states and fishing activities would be subject to regulation and control provided in such agreements. It recognized the rights of any state similarly to establish conservation zones off its shores in accordance with the same principles, provided recognition is given to any fishing interests of nationals of the United States which may exist in them. It was, again, noted in this Proclamation that the character as high seas of the areas in which such conservation zones are established, and the right to their free and unimpeded navigation, are in no way thus affected.[3]

Almost immediately following these declarations by the United States, there was a spate of declarations from other countries, ostensibly similar to the Truman Proclamations, but in many cases claiming much broader unilateral jurisdiction. For example, Argentina in 1946 declared its sovereign power over the continental shelf and the epicontinental sea (the sea overlying the continental shelf) although leaving these waters open to free navigation. In 1947 Chile made a unilateral claim to a 200-mile zone of unilateral jurisdiction respecting fisheries and, subsequently, in

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[1] See, for example, the recent report of the Committee on Oceanography of the National Academy of Sciences-National Research Council, Oceanography 1966--Achievements and Opportunities (NAS/NRC Publication No. 1492, 1967), or M. B. Schaefer, "Economic and Social Needs for Marine Resources," Ocean Engineering (New York: John Wiley & Sons, in press).

[2] William T. Burke, Ocean Sciences, Technology, and the Future International Law of the Sea (Mershon Center for Education in National Security, Ohio State University, Pamphlet Series No. 2, 1965).

[3] B. MacCheseney, Situation, Documents and Commentary on Recent Developments in the International Law of the Sea (NAVPERS 15031, Vol. II, Washington, D.C.: U.S. Government Printing Office, 1957).

1952 Chile, Ecuador, and Peru jointly declared the sole sovereignty and jurisdiction over the area of sea adjacent to the coast of each country and extending not less than 200 nautical miles from the said coast. El Salvador in September, 1950, followed the lead of Chile and Peru in claiming 200 miles of sea as part of its territory. The Republic of Korea in 1952 claimed national sovereignty over the shelf adjacent to its peninsular and insular coast and to the natural resources of the shelf and of the waters over the shelf.[4]

The ensuing claims and counter-claims involved a terrific lot of diplomatic and political activity, during the following decade, in the various apparatuses of the Organization of the American States, the United Nations and its specialized agencies, and the International Law Commission, as well as between nations and among groupings of nations.

Finally, there convened in Geneva in 1958, under the aegis of the United Nations, an International Conference on the Law of the Sea, for the purpose of attempting to negotiate a convention or a series of conventions covering the International Law of the Sea. The principal basis for the work of this Conference was the draft Convention on the Law of the Sea which had been developed by the International Law Commission, after long and detailed study, including opportunities for comment on the draft Articles by nations, by specialized agencies, and by various groups of technical specialists. As is well known, this Conference resulted in the adoption of four conventions concerning various aspects of the law of the sea, all of which have by now received the necessary number of ratifications and have come into force.

Several provisions of these Conventions are important in relation to free conduct of fundamental scientific research. It is clear from the commentary of the International Law Commission on the draft Article on freedom of the high seas, as well as from the debates at the Geneva Conference, that the freedom of the high seas encompasses the freedom to undertake scientific research there. However, the Convention on the Continental Shelf, while explicitly stating in Article 5 (1) that "the exploration of the continental shelf and the exploitation of its natural resources must not...result in any interference with fundamental oceanographic or other scientific research carried out with the intention of open publication," paragraph 8 of the same Article stipulated that "the consent of the coastal state shall be obtained in respect of any research concerning the continental shelf and undertaken there"; although it goes on to say that the coastal state should not normally withhold its consent under stipulated conditions.

Further extension of jurisdiction of the coastal state over adjacent portions of the high seas has been accomplished by the establishment of exclusive fisheries zones, contiguous to the territorial sea, such as that established by the United States under Public Law 89-658 of October 14, 1966, although there is no explicit provision for such contiguous zones for fisheries in the Geneva Convention. Within its territorial sea, of course, the coastal state exercises sovereignty, including sovereignty over all kinds of scientific investigation, subject only to such established rules of international law as the right of innocent passage. Beyond the territorial sea, the 1958 Geneva Convention on the High Seas recognizes a contiguous zone not extending beyond twelve miles from the baseline from which the breadth of the territorial sea is measured, in which the coastal state may exercise the control necessary to: "(a) prevent infringement of its customs, fiscal, immigration or sanitary regulations within its territory or territorial seas; (b) punish infringement of the above regulations committed within its territory or territorial sea." As is well known, it was not possible at Geneva in 1958, nor at a subsequent Conference in 1960, to reach agreement upon the breadth of the territorial sea. However, the International Law Commission in the report of its Eighth Session observed that international law did not justify an extension of the territorial sea beyond twelve miles. In the course of attempting to arrive at some agreement on the breadth of the territorial sea there was developed at the Conferences in 1958 and 1960 the concept of a contiguous zone for exclusive fisheries jurisdiction. Various proposals were made for combinations of territorial sea and exclusive fishery zones totaling twelve miles in breadth, providing also, in some proposals, for recognition of historic fishing rights of other nations either indefinitely or for a limited period of time. None of these proposals succeeded in attracting the necessary two-thirds majority. Since then, however, there has been a tendency for a number of nations, recently including the United States, as noted above, to establish a zone of exclusive fisheries jurisdiction beyond its territorial sea out to a distance of twelve miles from the baseline from which the territorial sea is measured.

Some nations, of course, including Chile, Peru, and Ecuador have continued to assert an exclusive zone adjacent to their coasts, wherein they claim sovereignty or jurisdiction, either for all purposes or for limited purposes such as fisheries, to a distance of several hundred miles, and have enforced these claims by arresting fishing vessels encroaching on this zone. Additional nations, such as Panama, have recently also adopted such broad zones for fisheries jurisdiction, and Argentina has recently again asserted, and is attempting to enforce, its jurisdiction over the fisheries in the waters overlying the continental shelf. There is some demand in sectors of the United States for an extension of exclusive fisheries jurisdictions well beyond the distance of twelve miles from the baseline of the territorial sea.

Complicating the matter somewhat further is the existence of bilateral and multilateral agreements concerning fishing rights over certain areas of the high seas, which provide for the exclusion of some participants from specified sectors of the fishery. The most notable example is the Convention among the United States, Canada, and Japan providing for exclusion of Japan from certain fisheries of the Northeast Pacific under the "abstention" principle.

Effects on Conduct of Fundamental Scientific Research

The developing regime of national jurisdictions over portions of the marine environment for particular purposes is imposing an increasing handicap on the efficient conduct of fundamental scientific research. While the handicap is not yet severe, it could become so in the very near future. The handicap on the effective conduct of research arises from four factors: (1) lack of certainty as to the geographical extent of jurisdiction of the coastal state with respect to the continental shelf and with respect to exclusive fisheries zones; (2) lack of certainty as to what kinds of research are subject to control by the coastal state; (3) length and uncertainty of time required to obtain permission from the coastal state to carry on research in the portions of the ocean under its jurisdiction; and (4) inaccessability of portions of the ocean, in the event the coastal state denies permission.

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[4] Ibid.

(1) Lack of Certainty as to the Geographical Extent of Jurisdiction of the Coastal State

The continental shelf is defined by the Geneva Convention as "...referring (a) to the seabed and subsoil of the submarine areas adjacent to the coast but outside the area of the territorial sea, to a depth of 200 meters or, beyond that limit, to where the depth of the superjacent waters admits of the exploitation of the natural resources of the said areas; (b) to the seabed and subsoil of similar submarine areas adjacent to the coasts of islands." Thus, just how far offshore the juridical continental shelf extends, depends upon the state of the art of exploitation of its resources, and on the question of how close is "adjacent." From the standpoint of the development of international law, to make possible the orderly exploitation of the resources of the sea bottom, it has been argued that this lack of definiteness is a good thing. At least, the matter was purposely left open at the Geneva Conference of 1958 until more knowledge and experience became available. From the standpoint of the scientist who is faced with the dilemma of choosing between going ahead and doing his work or requesting permission of the coastal state, which may be denied, or, at least, may take a considerable length of time to obtain, it represents a real handicap. Since, so far as I know, there is yet no agreed-upon criterion for the existing outer geographical boundary of the continental shelf, the scientific community is placed in a very invidious position. The geographical boundaries of contiguous zones for exclusive fisheries jurisdiction are defined rather precisely by most countries which have adopted them. However, the practice of nations is not uniform. As I have noted above, several countries have asserted jurisdiction for fisheries, and in some cases for other purposes, to distances beyond the twelve mile "limit" of the United States, even to 200 or more miles; and in some cases these have been enforced against commercial fishermen. The pamphlet "United States Oceanographic Research in Foreign Waters"[5] indicates that "the Department of State can advise operators of research vessels of claims to offshore jurisdiction and explain the difficulties vessels may encounter because of such claims." It is my understanding that the scientists choose to ignore such extended claims at their own peril, regardless of whether or not the United States recognizes the claim.

(2) Lack of Certainty as to What Kinds of Research are Subject to Control by the Coastal State

Article 5, paragraph 8, of the Convention on the Continental Shelf stipulates that "the consent of the coastal state shall be obtained in respect of any research concerning the continental shelf and undertaken there." This begs the question of just what kinds of research may be undertaken by scientists aboard a vessel lying in the waters over the continental shelf, without advance permission, without being in jeopardy for having violated the jurisdiction of the coastal state. This originally caused considerable apprehension among scientists when there were promulgated the draft Articles on the Continental Shelf adopted by the International Law Commission at its Fifth Session, because it was felt that there might be endangered the freedom to conduct scientific research on the soil of the continental shelf and also in the waters above. The Commission, in the commentary of its Eighth Session on its draft Article 68, attempted to allay some of this anxiety by asserting that freedom to conduct research on the waters overlying the continental shelf, which all form part of the high seas, was in no way affected. This, however, did not satisfy the scientific community, as is indicated in the document submitted by UNESCO to the United Nations Conference on Law of the Sea[6] transmitting resolutions and a communication from the International Council of Scientific Unions on this matter. It is noted in the communication that scientific investigation of the seabed, as apart from "exploration and exploitation of its natural resources" does not necessarily involve actual operational contact with the ocean floor. The wording of Article 5(8) of the Convention on the Continental Shelf does not seem to me to clarify this matter. In response to a request for further elucidation, an official of the Department of State has informed me in a personal communication that, as stated in "United States Oceanographic Research," "research on the continental shelf includes the removal of shelf samples (such as by coring and dredging) and living resources which are unable to move at the harvestable stage except in constant physical contact with the shelf. Research on waters above the shelf or on swimming creatures is not affected." He adds that "I might extend that by saying that research which involves physical contact with or into the shelf is shelf research and that which does not touch the shelf is not. Thus, measurements of magnetic fields of gravity, or the taking of acoustic subbottom reflection measurements, or water samples, would not be considered to be shelf research." I am grateful for this straight-forward answer. However, I am somewhat doubtful that other nations will necessarily accept this definition. Experience with the aftermath of the Truman Proclamations weakens one's confidence in relying on acceptance by other states of the fine points of definition made by the United States.

The problem becomes even more indefinite in the case of research in the exclusive fishing zone. I am, in this regard, informed by the same official of our State Department that fisheries research is a part of fisheries, and that the United States exercises the same rights in its exclusive fishery zone as it does with respect to fisheries in its territorial sea where there is no question but that it may exercise control over fisheries research. However, a definition of "fisheries research" becomes somewhat indefinite. My informant has kindly attempted to formulate such a definition as follows:

> "Fishery research in the contiguous zone. Fishery research is the study of the biology, environment, abundance, availability, and exploitation of fish or other aquatic organisms for the purpose of facilitating the utilization of those organisms for sport or commercial purposes. Such research in the contiguous fishery zone requires clearance. Research in the contiguous fishery zone for other purposes, even if it involves marine organisms, does not require clearance; this is true even if the research in question might be valuable to fisheries research, although done for other purposes."

I submit that this definition is not operationally very useful, because of the difficulty of determining the motives of the scientific complement of any particular research vessel. I doubt, therefore, whether I can rely upon it

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5 ICO Pamphlet No. 25 (Washington, D.C.: Interagency Committee on Oceanography, 1966).

6 United Nations Conference on the Law of the Sea. Resolutions by and Communication from the International Council of Scientific Unions concerning Part II, Section III, of the Articles concerning the Law of the Sea (Continental Shelf), Preparatory Doc. (A/CONF.13/28, January 13, 1958).

to determine whether or not I should request permission from any given foreign country before conducting any research in biological oceanography, or related subjects, in its exclusive fisheries zone.

(3) Length and Uncertainty of Time Required to Obtain Permission from the Coastal State

The foregoing uncertainties, in any particular instance, can easily be eliminated simply by asking the coastal state whether permission is required for the particular research, and, if so, requesting such permission. It would appear that any honest scientist, engaged in fundamental research with the intention of open publication, should have no hesitation about this procedure. The difficulty, of course, is that obtaining permits from governmental authorities is usually a time-consuming process, thus militating against rapid exploitation of scientific opportunities as they arise in the mind of the investigator. Equally serious is the uncertainty in being able to forecast the time required for obtaining permission from any particular state. The scheduling of large expensive research vessels so as to obtain the optimum scientific return for the funds expended is already a difficult enough problem, without throwing in this new element of uncertainty.

(4) Inaccessability in Event the Coastal State Denies Permission

Perhaps the greatest disadvantage to science of the continuing extension of the sovereignty of the coastal state over larger pieces of the high seas is that it will become increasingly difficult, and in some cases impossible, to conduct research requiring critical data from areas under the jurisdiction of some coastal states. This problem could become particularly serious, for example, in the case of some of the highly migratory marine animals that inhabit different sea areas at different stages of their life cycles.

Indeed, a doctrine of exclusion with respect of fisheries research, since it obviously includes studies of the life history and ecology of the exploitable organisms, can seriously militate against the conservation of the living resources of the high seas, in instances where the organism which occurs on the high seas also occurs in an exclusive fishing zone, and the researchers are unable to do their work in such zone.

Possible Solutions

It is obviously disadvantageous for the community of nations to handicap bonafide fundamental scientific research, the results of which will be made available to all, because such research is the indispensable basis of the new technologies, and means of conservation-management, that are required for the full and optimal utilization of the resources of the sea by all mankind. How, then, may the new regime of the sea be devised to safeguard the necessary freedom of fundamental scientific research while protecting the rights of the coastal states?

With respect to the provisions of Article 5(8) of the Convention on the Continental Shelf, McDougal and Burke[7] have suggested that the most desirable alternative, if possible, would be simply to delete it. They believe that the rights of the coastal state would be sufficiently protected if there was simply a requirement for notification of planned research in terms of objects and methods, leaving it open for the coastal state to object if the research appeared a disguised effort to explore or to engage in actual exploitation. This device would avoid the necessity for securing the affirmative approval from the coastal state in every case of planned research, a procedure which tends to introduce extraneous considerations. This suggestion seems to apply equally well to the problems of the exclusive fishery zone. It has the merit that it avoids the problem of definition of the boundaries of the zones of exclusive jurisdiction, as well as the definition of the particular types of research that may be forbidden by the coastal state. There would, still, need to be worked out some machinery for taking care of the details, such as the means and time of notification and procedures in case of objection by the coastal state. However, this is probably beside the point because, as McDougal and Burke note, to expect that states will join in rejecting a provision so recently formulated is perhaps unrealistic.

The second possibility is that suggested by the International Council of Scientific Unions in November, 1958, following the negotiation of the four conventions on the law of the sea in Geneva in the spring of that year. The general assembly of the ICSU resolved to request the nation members of ICSU to ask their governments, when ratifying the Convention on the Continental Shelf, to signify at the same time that they grant general permission to any scientific research vessel to conduct investigations, provided the program is specifically approved by ICSU, whereby ICSU will guarantee that the investigations are leading to results which will be openly published, and whereby the coastal state should be notified a sufficient time in advance so that it may, if it desires, designate a representative to take part in the work; it being noted that this proposal is designed to facilitate the operation of Article 5 of the Convention by assisting governments to identify bonafide scientific research and to avoid diplomatic delays which would jeopardize many types of scientific investigation.

Dr. Detlev Bronk, President of the National Academy of Sciences of the United States, urged the Secretary of State to give favorable consideration to this ICSU resolution. His letter also stated that a no less acceptable alternative would be for our government to take the initiative of offering to grant this permission on a reciprocal basis to research vessels of all nations which grant similar permission to our research vessels. The State Department consulted the Department of Interior on this matter and was informed by the latter department that it believed that the United States should retain the power to permit, prohibit, or regulate activities by foreign nationals on the United States continental shelf, and that the delegation of this power to ICSU would be unwise. Dr. Bronk was advised of this, with the additional statement that from the standpoint of foreign relations the Department of State was inclined to share the view of Interior; it was also noted that the Department of Defense would seem also to have an interest in such decisions.

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[7] M. S. McDougal and W. T. Burke, The Public Order of the Oceans (New Haven: Yale University Press, 1962), pp. 701-60.

Subsequently, the National Academy of Sciences' Committee on Oceanography further investigated this matter with representatives of the Departments of Defense, Navy, Interior, Commerce, and State, with the result that it appeared that it would be practically impossible to obtain the consent of the United States government for the ICSU proposal but that some sort of bilateral agreements might be possible. It was noted that, with a declaration from the President of a policy of easy access to the continental shelf by scientific expeditions, the State Department might be helpful in expediting arrangements. It was agreed that NASCO should bring this problem to the attention of the Federal Council on Science and Technology, Subcommittee on Oceanography (Wakelin Committee). In October, 1959, Harrison Brown, Chairman of NASCO, suggested to Dr. Wakelin that it would be most appropriate for his Subcommittee to take the responsibility for coordinating the views of the various government agencies, with the objective of formulating a statement of policy by the United States government at the time of ratification of the Geneva Conventions. Dr. Wakelin replied that while this is a subject of vital importance there was a question whether his Subcommittee should extend its functions to consider the formulation of national policy for planning international access to the continental shelf. He stated further that the Federal Council was in process of establishing a permanent Interagency Committee on International Science, that this committee might be the appropriate group to deal with this matter, and that he was referring Dr. Brown's letter to Dr. Kistiakowsky for appropriate action.

So far as I know, the matter was not pursued further by the Federal Council. At least, none of the suggested statements of policy were promulgated at the time of the ratification of the Geneva Conventions.

In view of the growing importance of the problem of insuring freedom of scientific research, I urge that there again be seriously considered the possible solutions arising from the foregoing activity, these being:

(a) Designation of the International Council of Scientific Unions, or some other suitable international body, to certify bonafide fundamental scientific research agencies and/or expeditions that the coastal state would automatically grant permission to carry on research in waters under its jurisdiction.

This solution seems quite attractive, especially if it is done by voluntary declaration of the coastal states. In this event, the coastal state is not, so far as I can see, abrogating or compromising any of its rights. Since the arrangement would be purely voluntary, the coastal state could withdraw from it any time that the privilege was being abused.

(b) Bilateral or multilateral arrangements among particular nations.

This approach is perhaps somewhat less satisfactory than the foregoing because it will doubtless require much more formal arrangements by way of treaties or other agreements in consequence of which the establishment of a suitable regime involving many nations will take considerable time, and also because it is more difficult to terminate such formal arrangements if they prove to be unsatisfactory. However, since this is a familiar procedure among governments, it may be the only practical way to proceed. Surely the establishment of bilateral arrangements with our neighbors who are closely allied with us politically and economically should be easy to effect, and the system may then be extended.

Alternatively, one might attempt to establish inter-governmental regional agreements, which would allow free access by bonafide research vessels of the member nations. Multilateral regional agreements are, of course, more difficult to consummate than bilateral agreements. One might, therefore, follow the example of the convention establishing the Inter-American Tropical Tuna Commission, which was entered into initially between the United States and Costa Rica but was open to adherence by other nations, on the basis of which the arrangement grew to a multilateral one over a period of years.

It is not immediately evident which of the foregoing possible solutions is the most practicable nor, indeed, whether there may not exist some other better alternative. The problem is of sufficient urgency that various possible solutions should be vigorously explored. I urge that the United States take the lead in attempting to arrive at a solution.

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DISCUSSION

Question: A problem which bothers me is that this data--once collected and published--can be used for more than one purpose. I feel that as nations become more aware and sophisticated they are going to realize that the collection of data around the continental shelf of their country may be detrimental to them. If a scientist were to attempt to publish bathymetric charts of the coast of California with data points within the five-mile limit it would be classified. I feel, and I think it is a fact, that any data that you can collect for basic research off your own or off foreign coasts, even though the research might have a wonderful purpose, can be used by the military; once the nations realize this they are not going to favor oceanographic vessels coming off their continental shelves and collecting all sorts of oceanographic data, even though they realize that basically it would be good to acquire such data.

Schaefer: Well, I would be glad to comment on this. I have been involved with it, and in fact we specifically did make some charts of the eastern Pacific, or at least Bill Menard of my Institute did, and he made them on the basis of unclassified data. This was some years ago; they turned out to be a good deal better than the classified charts that the boys in the submarines were using. Ours had been cleared by the Navy, but they caused a good deal of consternation. However, my comment on this is that one has to have some faith that he is gaining more by getting basic scientific knowledge all over the ocean, including off the coast of the other guy and so on, than he is losing by perhaps having revealed some things on his coast that he would rather not have other people know. As Roger Revelle put it, it is probably not wise to try to classify what God has already classified. In other words, classification of devices and so on is all right, but the secrets of nature are not a thing that you can keep locked up. They will eventually be discovered, and the only question is: are we going to gain more by trying to keep the secrets of nature off our coast locked up than the nation will gain by having free research that is widely published that everybody can use? I submit that, in general, the opinion of the people in this country, and of men in general, including most deep-thinking military people, is that in the long run we are better off to encourage free basic research with open publication.

Goldie: If I may add something. It seems to me that we are verging on a debate that really only came to the fore after World War II. It is a debate basically between the military on the one hand and the scientists and the academics, who generally supported their scientific colleagues, on the other. There are those who advocate locking up secrets that have been discovered in the hope that somebody else may not uncover them for a while; but eventually they come to be known and all that has been accomplished are paper work, frustration, and temporary loss of image. It seems to me that it is more important to apply the freedom that the framers of the country's constitution had in mind when they wrote the first amendment to this kind of thing than it is to erotic magazines.

Schaefer: I would like to go on, and I have just one further comment to this. It is that you may have some color of argument, although I don't personally agree, that it is a wise thing in the case of defense. I think that your argument becomes even weaker if you simply don't want people to know about the sub-bottom mineral deposits on your shelf, which you own anyway, or don't want them to find out about the fish in your waters.

Question: No. I was thinking with respect to data of a foreign country or industry that you might be able to use, whereas if you were to give that same data about your own country they would not have the capability to capitalize on it.

Herrington: There is another aspect of this that bothers me. The scientists appear to feel that bona fide research should not be impeded, provided it is for open publication and there is a guarantee of the nature of the work to be done. Now it would be very easy for a research vessel staff to present a bona fide research project which would be fully published but also to carry on some other research at the same time without open publication. There is no assurance that all the research carried out would be published and no one would ever be able to check that. It seems to me that these two criteria give very little assurance that all the work being done would meet the two requirements.

Schaefer: I would like to answer that. I think that the provision, the additional provision, would be that the coastal state has the right to put somebody aboard to participate in the work. One could conceivably, if there was a guy aboard, be carrying on something else, but there is more protection.

McKernan: I have two points to make with Dr. Schaefer, really three. First, I agree with him that it is important for some resolution of the problem to be reached, and I also agree with him that the United States ought to take the lead; but there are still problems. For example, just recently the Department of State received word that an American research vessel had been picked up off the west coast of Mexico. It developed that this vessel had headed for Mexico without notifying its own government nor the government of Mexico that it was coming down, and some forty-eight hours before it began operating off the west coast of Mexico it notified us that it wanted permission to enter Mexican waters. We did everything we could but there was not enough time to receive official permission from Mexico. The point is that the scientists themselves are often not very reasonable. Incidentally, the Mexicans arrested the boat, and in my judgment they had perfect justification for doing so. The vessel was down there catching bill fishes. This is carrying out research but it is also rather a difficult public relations problem for the government of Mexico.

Schaefer: Perhaps it would help if you would spell out some rules. The time varies, you see. This would be perfectly satisfactory if you were notifying, and had to notify, at least two months in advance, so that the people would have a chance to look it over and object.

McKernan: Another point I wanted to make concerns what is fishing and what is research in the case of fishery research. Some countries, for example, that have rather good-sized fisheries at the present time employ what they call fishery research vessels, sometimes eight or nine of them at a time as a fleet. These often are stern-end trawlers, which are in fact exploratory vessels with the capability of taking literally thousands of tons of fish during their exploratory cruises. What they are trying to do is define populations of fish, locate them, and in some cases direct commercial fleets to them. In the process these vessels take commercial quantities of fish.

Schaefer: I would think that is quite easy to answer. I was quoting the definition of your colleague as to fishery research. If you let me define it, I should not define it the way he did. I would define fisheries research, that isn't permitted, as being exploratory fishing that caught a certain amount of fish, and so on. That is not fundamental scientific research, if it is simply fisheries exploration and development. I think it is fairly easy to define. I think when you try to say, if a man is taking some plankton samples, that if he is doing it with the idea of improving his fisheries that is fishery research, and that if he is doing it to find out about plankton, it isn't, you do not have a useful definition. I don't like your definition; I was merely quoting it.

McKernan: Fine. But I point out that this is a problem which has not been resolved at the present time.

Schaefer: Exactly.

Chapman: Well, as Dr. Schaefer knows, I am in favor of science; I am opposed to sin; I am in favor of motherhood; and I ordinarily go to church at Easter. But I would like to take the Devil's Advocate point-of-view here at the moment. I am not sure of my rights, but I think that no scientist has the right to come in my backyard and poke around doing this and that without my permission. At least I would attempt to run him off if I found him doing so. However, if he asked my permission the chances are I would let him do what he wanted to do. My situation as a sovereign is that I own the continental shelf and I don't think I want those guys poking around out there on it without my permission. I think that this is a reasonable position. I have said in the treaty which I signed that ordinarily I would let him do it, you know, but I don't trust those guys very much because pretty near all of them make a living doing classified research for the military, and furthermore when they get joined together in an international union they are probably less trustworthy than otherwise. Thus I think I could make a pretty good case that they have been given pretty near as much leniency in this convention as they have coming to them.

Goldie: Whilst giving a convincing appearance of conceding to scientists privileges which they now lack, Dr. Chapman has just cogently argued for limiting still further freedom of scientific research. He achieved this effect by an admirable sleight-of-words--by analogizing a state's claim to the continental shelf beyond its territorial waters to his own freehold in his backyard. If this were the true analogy Dr. Chapman would have us believe it to be, then much of the work of the International Law Commission and the 1958 United Nations Conference on the Law of the Sea at Geneva invested in reaching the definition of coastal states' rights over the shelf now to be found in Article 2 of the Continental Shelf Convention was a purposeless labor. The Commission's formulations and the Convention tell us that a coastal state does not enjoy an international law equivalent to a freehold estate (i.e., full territorial sovereignty) over the continental shelf adjacent to its coasts and beyond territorial waters. The nearest real estate analogy (and Dr. Chapman started us on this questionable enterprise of drawing international law analogies from our own very parochial and technical land law) would be a profit à prendre--the right merely to take the resources and fruits of the soil without owning the real estate itself. Be that as it may, the Continental Shelf Doctrine is new; the rights it establishes are new. Necessarily it abridges the range of pre-existing rights stemming from the freedom of the seas. These new rights have been upheld because a widely-held belief has developed in their superior social utility over the older rights whose scope they limit. But this process of balancing the social utilities should not operate merely in favor of the Continental Shelf Doctrine. When the social utility of such countervailing claims as the freedom of scientific research weighs more heavily than the material, economic claims sustained by the Continental Shelf Doctrine, it is these latter which should, in their turn, be abridged. They should be abridged in the name of the freedom of the seas, of which the freedom of scientific research is a part, and an increasingly significant part.

Aglen: The Council of the High Seas pointed out that it had been customary for research vessels of all member countries to be allowed inside limits of a country to pursue their activities, providing they notify countries of their plans. But the Council was concerned about the effect of Paragraph 8 and the limitation it might have on freedom where fishery is concerned which involved research on the sedentary species lying off their shelf and taking of cores and so on. The Council asked member governments therefore to waive the consent under Paragraph 8. The first reaction was that it wasn't possible to waive the consent just like that, but if such programs were submitted to various governments they would be glad to consider waiving them. So on behalf of the fisheries people we pointed out that this submission would be merely a delaying move and consume a lot of paper; besides it would prevent research vessels from taking opportunities when they arise in the course of a cruise. The final solution I think has either been solved or arranged; a solution on the basis that permission will be waived provided research vessel programs are submitted to a high seas research group and a list of bona fide research vessels is circulated to governments. It should not be necessary to have your research program put in before this waiving is brought into operation. I am not sure whether that has been quite tied up finally but that is the way it is being tackled by the Council of the High Seas.

Schaefer: This is very encouraging. This is sort of a regional agreement, though, that you are referring to.

McKernan: I apologize for speaking again but I feel that perhaps some clarification is necessary to some remarks made by Professor Swygard*. I think that at least what he said concerning the Northwest Pacific Treaty between Japan and the U.S.S.R. was misleading. I don't believe that the U.S.S.R. has particularly forced any conditions on Japan. I think both countries, as I understand it, realized the need for both a conservation arrangement and for a treaty in the Northwest Pacific. I don't particularly agree to some aspects of the treaty but I believe that Mr. Kamenaga would agree with me that this treaty is a necessary one in order to maintain the resources of salmon in the Northwest Pacific. Therefore, I think to be fair to the Soviet Union it would not be right to say that they forced on a sovereign nation, such as Japan, particularly difficult conditions, although Japan might disagree with that.

Secondly, he spoke about the need for revisions of certain of our fisheries conventions. Now I suppose, in fact I am quite certain, that there is a need for some revisions but I wonder if he had anything specific in mind. The United States has just recently negotiated another convention quite similar to some of the ones we now have in effect. If he has any specific suggestions I think it would be helpful.

* The text of the paper presented by Professor Swygard appears on pages 65-69.

Thirdly, he spoke about some unwanted compromises in the recent United States-Soviet agreement on the west coast. Since I had some small part in that negotiation I would like to know what he has in mind there. In my judgment the general direction of that agreement with the Soviet Union corresponded to the direction that I think this nation is going in future agreements. I am not aware of any serious, unwanted compromises that this nation agreed to in that negotiation and I would like his clarification of that.

Swygard: In regard to the first question, I noted that distribution might change for a multitude of reasons, including action by fisheries commissions. Specifically, I noted that Japan had been "forced" to accept a lower salmon quota under the operations of the Pacific Northwest Fisheries Commission (Japan-U.S.S.R.).

The word "force" was taken from a Japanese statement published by the Bureau of Commercial Fisheries in a Foreign Fisheries Information Release. In view of the power relations between Japan and the U.S.S.R., the Japanese might well have felt a compulsion to accept a reduction which they disliked. In any event the manner of the reduction was incidental to the major point that a redistribution resulted from action by the Commission. There was no intent to deny the utility of the program.

The question of voluntary as opposed to forced compliance also arose in regard to the 1952 fisheries treaty involving Japan, the United States, and Canada. Differences of opinion have been expressed concerning the question, "Did Japan act as a completely free agent or under a measure of compulsion?"

In regard to the second question, I believe that Dr. Kask's paper points up the shortcomings I have in mind. The delegation of powers, structural organization, and administrative procedures need to be reviewed and revised in some cases.

On the third question, I would emphasize that the United States-Soviet agreement is not a long-range solution. The agreement was set for one year because of doubts concerning its efficacy. At the end of the year renegotiations on the same points will be required. American delegates to the conference are to be commended for their success in obtaining a more favorable agreement from the U.S.S.R. than some people anticipated.

My purpose in discussing this matter was again focused primarily on the burden of my topic which was "future distribution." Distribution was affected by the agreement and a failure to renegotiate new agreements or a revised agreement might also change the pattern of distribution in future. My purpose has not been to attack any agencies or agreements but to attempt to show how distribution may shift as a consequence of the actions of agencies and the nature of agreements.

Herrington: I was going to remark that every agreement reached represents compromise. One definition of an ideal compromise is an agreement which makes both parties equally unhappy. You will probably find that both parties were somewhat unhappy about one part or another of the agreement.

Swygard: Would you apply that also to the agreement that we reached with the U.S.S.R. on February 7?

Herrington: I wouldn't care to comment on the details of this, but I would expect so.

Oda: So far as this 1956 convention with Japan and Russia is concerned, the Russians were not concerned with any form of salmon fishing on the high seas. Only Japan was engaged in fishing for salmon on the high seas and this convention provides for conservation measures only on the high seas. It means that the salmon fishing in Russia is not subject to the convention because in Soviet Russia they fish salmon in the rivers. So this convention only regulates the salmon fishing of the Japanese. On the other hand, this joint commission considers the total catch every year, but this total catch means only the total catch by the Japanese fishing industry because the Russian salmon industry is not regulated by the convention; the Russians take their salmon within their area.

Chapman: I think a little historical note might be useful at this particular point in the discussion. The events leading up to the Geneva Law of the Sea Conferences included a conference on the Conservation of the Living Resources of the Sea in Rome in 1955, under the aegis of the United Nations, and this was at the request of the International Law Commission for the purpose of giving them technical information that they could include in their 1953 draft of the material for the Law of the Sea Conference. In the course of this conference there developed the concept of the right of the coastal state to take unilateral actions with respect to fisheries (fishing activities by the nations off its coast under certain circumstances). One of those situations was where there was legitimate fear of overfishing and when the other country would not reach suitable agreement to attend to that problem. That this was in fact developing international law was certified by a provision of that nature actually being included in the 1958 Convention on Fishing and the Conservation of the Living Resources of the High Seas. So the Russians, immediately after the 1955 conference and not waiting for this to be formally put into the international law in treaty form, took the action of establishing a zone in the area in the Northwest Pacific particularly in respect to salmon, and they had a pretty good case. It looked like there was overfishing of salmon in the area. At least that point was not successfully challenged by Japan. So what Russia did was act unilaterally, but said at the same time that they would be happy to enter into a treaty with Japan to put this on a more stable basis and that is what happened. At least from the statements of the Japanese foreign minister as recently as three or four months ago, this is a treaty that the Japanese think is a useful and well-working one. He said this when the delegation was leaving Moscow after the last round of conferences under this treaty. So I think in this instance you can't blame the Russians for acting much ahead, anyway, of developing international law.

Members of the Panel: Tomoyoshi Kamenaga, M. B. Schaefer, Thomas Fulham, Hiroshi Kasahara, Francis T. Christy, Jr.
Moderator: Wilbert M. Chapman

OPENING REMARKS

Wilbert M. Chapman
Van Camp Sea Food Company
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I have been putting these figures on the blackboard every day for a purpose. This is the one firm figure involved throughout--46 million tons of fish caught in the world ocean last year. Dr. Schaefer has estimated on the basis of the sorts of fish that are currently being caught by the present methods, with no revolutionary fishing changes, the potential production of the world ocean is in the neighborhood of 200 million tons, about four times as large. He also notes that present yields would give an adequate animal protein diet for 6 billion people if it were spread out equitably amongst the people. It follows from this that 200 million tons would be nearly enough protein under these conditions for 30 billion people.

Dr. Kasahara and I guess total useful production of the ocean to be around the 2 billion ton mark. Dr. Kasahara is so reluctant to stand behind that figure that he has suggested I put my name up alone this morning instead of his. The only reason for this large number at all is to indicate that as we go from here to there (from 200 million to 2 billion tons per year) we do so not through necessity, from the standpoint of human nutrition, but from desire rather than need for animal protein.

My reason for mentioning this aspect this morning is that as you go from 46 million tons per year to 200 million tons per year, which I think everybody associated with the question thinks to be a reasonable escalation, you get into an entirely different sort of fishing industry, fish trade and everything. There are not 200 million tons of big predators available in the ocean. I don't think anybody thinks that. Historically, we have used fish from ten inches on up in size as food fish. The great fishery expansion in the last twenty years has been made up very largely of fish between five and ten inches in length. These have been mostly used for fish meal production. My own guess is that as we go towards the point of 200 million tons per year yield we will go increasingly to organisms in the size range between one to five inches. I also believe that one of the characteristics of the fish business which will change is that as we go from present yields to greatly expanded yields (from the ten-inch length to the one-inch length) we will go increasingly to the use of fish simply as animal protein and that it will be used increasingly in formulated foods for animals, either human or others.

I would like to point out briefly that the expensive qualities of fish are taste, texture and appearance. Animal protein can be produced very cheaply from fish. To keep these qualities of taste, texture and appearance attached to the animal as far as the consumer, however, is an expensive operation. Animal protein produced from bluefin tuna has approximately the same nutritional value and quality as that produced from anchovy. The cost difference is that because of the taste, texture and appearance of the bluefin tuna if fresh and on the Tokyo market just before the holidays, you can get from $2,000 to $3,000 a ton for it in that condition; whereas the anchovies you can buy for $10 to $15 a ton. The animal protein content is not appreciably different in nutritional value or other quality. So I think that as we move along in this business we will be using smaller animals, in the more abundant and cheaper catching category, these will be reduced to animal protein and edible oils, and that is where the expansion in the fisheries will come from.

THE MANAGEMENT OF WORLD FISHERIES

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First of all I want to make clear that I do not represent the government of Japan nor the industry, rather I represent myself personally and the views which I offer this morning are strictly personal.

My topic this morning does not necessarily deal with the fisheries of Japan. My speech will not directly cover the Japanese fisheries as such, although later on in the discussion session I shall try to answer the questions you might have on the Japanese fishery.

The problem of fisheries as you all know is quite complicated, partly because of legal observations but also because of biological, economic, and historical factors. For these reasons it is a very complex problem which must be seen from every point of view. In this way it is possible, I think, to view the problem of fisheries as a distribution of natural resources or a distribution of food among human kind.

The land of the world is already divided among sovereign states due to historic or traditional reasons, and its division is safeguarded by the idea of "World Peace," which is deemed to be the common goal of human beings. Therefore, the utilization of the natural resources on land and the distribution of their products are solely in the hands of each owner nation. However, fishery resources are open to the free use of any nations who want to utilize them, except when there exists a certain law or practice on an international basis. This freedom of the high seas has given an opportunity for exploiting fishery resources which otherwise would not be available for human consumption.

In the course of fishery exploitation, certain challenges to this principle have been made by various countries, first by extending the limit of territorial waters, second, by establishing fishery zones, and, third, by introducing the concept of the continental shelf. These three challenges have been aimed at reserving a wider area of the ocean for the countries' exclusive benefit. And a fourth one is the regulation of the high sea fisheries on the basis of scientific thought, namely, "Conservation" or "Maximum Sustainable Yield." There is no reason to doubt that this way or thinking has been solely scientific and related to the physical productivity of fishery resources; it has almost nothing to do with the economic way of thinking. Nevertheless, it may be noted that these concepts have often served to maintain or extend individual nations benefits through scientific theory, although such theory may be ambiguous owing to a lack of sufficient knowledge of sea resources.

At the present stage of the world's political status, independent sovereign states exist, with populations to support and territory to supply their food needs. We cannot separate the problem of high-sea fisheries from the food supply which comes from the land. An important point here is how we deal with the social aspect of the fisheries.

Social Aspects of Fisheries

The fishing industry made available resources of the sea for human use which unless exploited had no value. Fishery products are directly connected with the supply of food or the maintenance of human life. Further, the fishery industry is a social group composed of private enterprises which pursue profits in a capitalistic economy. Concerning the former aspect, any nation conducts its fishery first to supply its domestic needs and, secondly, for its international trade. Whatever might be the intention or the results, the fishery is directed to the supply of animal protein for human beings. It must be noted that there has been a general opinion as to the future shortage of animal protein supply which might be ameliorated by the possible existence of large unexploited stocks of fishery resources in the oceans.

From the latter aspect, private enterprises are basically in pursuit of a profit. It is true that the establishment or maintenance of private enterprises is essential for the supply of food from the sea; however, too much emphasis on this often leads to the incompatability of the former postulate.

The increase of food supply is a postulate on a nationwide or international scale, but pursuing the highest profitability of a certain group of industries could not be held to be necessarily a nationwide or international postulate. The only thing we can say is that each nation must make its own choice when faced by the incompatability between the two postulates.

Management of International Fisheries

Some economists state that participation in fisheries should be conducted to the extent that the total catch value equals the total input cost, that the fisheries should be so managed as to maximize "Net Economic Yield," and that the concepts of NEY and of "Maximum Sustainable Yield" are mutually exclusive, in that there is no possible compatability between them. From the standpoint of economic analysis this is undoubtedly true. At the same time due consideration must be given to the change of conditions which are flexible in accordance with other factors.

The existing management of the sea's resources is based on certain practices and traditions, whether they be national or international. It is generally understood that the management is conducted so as to secure the largest possible physical productivity, taking into account national social and economic circumstances. In other words, management has been such as to harmonize the political or economic factors peculiar to each nation. The adoption of the economic rules of NEY as the principle of fishery management could be quite worthwhile where the profit motive is an essential requirement.

However, where the social function of fisheries includes the supply of food or the opportunity of employment, the principles of management would not be so simply decided. Though management depends upon the national option in the field of domestic fisheries, the situation would be of more complex character in international fisheries. The principles of MEY are based upon numerous fluid factors, such as sale price, loan interest, labor cost, vessel expense, and so forth. Particularly at the international scale or in the international time series, there are too many variations and flexibilities to permit a common and stable index of economic evaluation to be applied.

Furthermore, as some people suggest, when the United Nations becomes the managing body what criteria would there be for the national distribution of the entry? Perhaps one can find no adequate reply and only say it is a matter of international politics which is closely connected with the distribution of food, natural resources, and population.

If the present regime of fisheries remains as it is, I should think the two most important factors would be the price of fishery products and the labor costs. Unlike rice or wheat, fishery products are of such variety that we cannot handle all of them in the same manner. Even in the case of similar items, prices may vary considerably from nation to nation. Of course, one may expect that some prices can be equalized according to the general trend of the international reorganization of trade in fishery products, but we cannot expect that all such prices can be equalized from nation to nation.

A second factor is that labor costs vary considerably, depending on how high the standard of wages is in a given nation. Unlike other manufacturing industries the fishery industry cannot expect a lowering of labor costs by introducing the so-called mass production system because there are special factors here. Some tendencies exist toward modernizing the fishery industry, such as through technological innovations or the build-up of productivity but, as you all know, even with these two factors we cannot expect through keeping the labor costs at a certain level that this will automatically draw up the general standard of wages. This can be said about almost all the free, capitalistic-economy nations, which includes both Japan and the United States. In the communist countries the economic system is, of course, different from ours, although even in the Soviet Union there has been a trend in recent years toward profit incentives which brings it closer to our pattern.

If the present regime is to remain, those countries in which fishery products find high prices and in which wages are generally low will dominate fisheries production in international waters. Technological innovations will not be a primary criterion. To meet this problem some nations will insist that their zones of exclusive fishing be extended farther offshore than the present limits.

The problem of international fisheries is largely a political one and the issue of exclusive right of fisheries is nothing but a political question. In Japan we say there are no international boundaries in science. However, economics still has a distinct international boundary. As you all know, in the scientific field MSY is a common word among biologists. In many international conventions or agreements this idea has been introduced. We can adjust fisheries agreements in the future by introducing this unique concept of MSY. Of course, this concept has conflicts when the national interest comes so crudely in the international scene that the scientific concept is disturbed by the international political strife. As a principle of management Maximum Sustainable Yield may not necessarily be adequate from the viewpoint of national economies since it does not include within it means to distribute the yield from the resource among the nations concerned. But the problems of national quotas are not a matter of science; the only way at this time to decide a national quota is by negotiations among nations. So the concept of MSY is the only one common international principle. If we could find some other rules by which we could decide national quotas along the productivity concept of MSY I think the economic concept might sometime be useful. However, any such economic or other idea must always be subject to the scientific principles of MSY.

The exploitation of unexploitable resources should be freely open to all nations. On land when a mine is discovered the discoverer's right of mining is generally respected by other countries. The fisheries and mining industries are different; minerals cannot be reproduced whereas fish stocks can. I also believe that the discoverer of a certain fisheries resource should be given certain rights to exploit that resource.

It may seem obvious to note that the natural resources of the world are gradually disappearing while the demands for animal protein are getting greater each year. In Japan as in other countries it is true that some natural resources which were never consumed until a few years ago are now eaten as part of the daily diet, so we should be conscious of the importance of our unexploited natural resources. For example, in the Okhotsk Sea we have a fish called the pollock. Up until a few years ago the people in that area caught this particular animal as bait; even the cats would not eat it. Now nearly 300,000 tons annually of this fish are being produced. This has resulted from its use in the development of minced meat with which we produce fish cake or fish sausage. A similar example is hake, which is now being taken for human consumption.

In summary, let me say, first, that there might be some means to facilitate an international arrangement for the development of presently unutilized fishery resources. Second, I think that an overall biological and scientific concept related to the Maximum Sustainable Yield is a valid one as a common denominator among nations. Under these two principles if it becomes necessary or desirable for the total production from one resource to be divided among the countries concerned it would have to be done by direct negotiations between those countries and specific arrangements could then be made for national quotas.

DISCUSSION

Herrington: Mr. Chairman, I have a comment. I notice that as the wage scale rises and hungry fishing nations increase, the Japanese and United States positions come closer together.

Kamenaga: That is quite true only in that it represents a tendency. The tendency is that possibly the Japanese fisheries will follow the way of the United States or the United Kingdom. Frankly speaking, it is not the way for prosperity.

Comitini: Mr. Kamenaga said that the countries with the high prices for fish and low labor cost will dominate world fisheries. I wonder if you had any specific countries in mind. And also it is usually the case that these countries that are generally developing today export their fish to other countries; they have a low labor cost and generally export to countries with high fish prices. Could you clarify this for me?

Kamenaga: The price of the fish product is also a part of the price of the general commodity. So if the consumption is stronger the price will be higher. As a matter of domestic comparison, it relates to the wage level among various domestic industries and as a matter of international comparison it also relates to the price of fish products in foreign markets. But as I said already, there are exceptions because of varieties of fishery products. For example, in the case of tuna in Korea if they get a larger number of vessels and sell tuna to the United States using the Korean fishermen who do not enjoy wages as high as the Japanese, we will not be able to survive in the tuna fishing. But for some stocks which were particularly used in a country and even when the price is very high, it is possible for the country to still retain its operation because of the particular consumption there.

Chapman: I think I can illustrate it with an example. In Japan there are several fishery commodities that are so desired there that the price is far higher than in the world market. Those sorts of fisheries will probably continue to be dominated--I think that is the thought here--by the country having the high-priced market. Did I detect in the question the thought that the export of fish by low income countries was bad?

Comitini: No.

Question: Mr. Kamenaga, do you see a large increase in the amount of fish farming in Japan?

Kamenaga: That is a very important problem. As you know, we are doing our best in the way of research and improvements of the fish farming techniques, but up to this point fish farming has been under individual control. The farms must be enclosed by fences or cages or something like that. For that purpose the place or site of production is quite limited. The coasts which face the open sea will not be adequate. Some waters surrounded by islands, as well as inlets, lakes, and ponds are the only areas available. I think that last year the production by fish farming amounted to only one per cent or two per cent of the Japanese total catch.

Kasahara: I have that figure here. In 1965 fish pond culture or farming produced in fresh water approximately 33,000 metric tons and in salt water about 19,000 tons, as compared with nearly seven million tons of total landing. That is less than one per cent.

Chapman: I think these are the figures: 6,700,000 tons total production, of which 19,000 tons were salt water fish farming production and 33,000 tons fresh water fish production, about 335,000 tons oysters farmed and about 136,000 tons seaweed produced, a total farming of about 400,000 tons and a total wild fish production of 6,300,000 tons. This fish farming business propaganda is blown up far out of proportion.

Kasahara: Another point we have to look into about this fish farming is the amount of food used to raise fish, which is something like five to eight times the amount of fish produced in either fresh water pond farming or salt water culture.

Chapman: You had some figures on this?

Kasahara: I have detailed figures here for Japan if you are interested. In 1965, in order to produce 28,000 tons of fish in fresh water farming roughly 120,000 tons of fish and 24,000 tons of other feeding stuffs were used. In salt water, in order to produce 18,000 metric tons of yellowtail (this is amberjack) approximately 140,000 tons of feeding stuffs, mainly fish, were used.

Chapman: Fish farming is good for making money in some instances but it is negative from the standpoint of producing protein.

Kasahara: This is only in Japan. Of course, in the tropical areas they make better use of natural productivity, even by fertilizing ponds, and thus the picture is different.

Chapman: But in the instance where there is still so much wild production available unutilized in the ocean it is simply impractical except in very few commodities to farm against the cost of the wild product. Nobody domesticated cows until antelope were in short supply.

Esterly: I was wondering if there were not other factors involved when you are considering fishing and exploiting the resources of the sea. Isn't there a moral obligation to prevent the extermination of a species? You mentioned, for example, the economic factors. You mentioned, also, the conservation and political factors, the biological and scientific factors, and so on. I was wondering, if you take the example of the whales, especially either the Arctic or the Antarctic whales, isn't there also the factor that among mankind in general, let us say, that we are very reluctant to see this form of animal life disappear? At the present time you could fish whale and you could exploit them economically and use the resource but you may kill off the species. Accordingly, would you say that sometimes you have to consider, in addition, that humankind places a more or less cultural or social value on a resource?

Kamenaga: I think by that time the concept of MSY would be applied. But it is a biological point of view as you know and as to cultural factors I am not sure. There might be an international feeling or a moral feeling in the actual handling of the whale business but I think that if the biological idea, that is MSY, is properly conducted it will satisfy such a cultural desire from people.

Chapman: Could I contribute a little bit to that question? I think it is the whole spirit of Kamenaga's argument that the whales should be kept at a level not less than corresponds to the maximum sustainable yield.

I would go on a step further in that and suggest this to you that the Antarctic whales eat substantially all Euphausids, or at least Euphausids are a major part of their diet. Euphausids are small, shrimp-like animals not presently used by humans in any direct way at all, except Mysids a little bit in Japan. I think there is quite a good possibility that within the next ten or fifteen years Euphausids will be used for direct human consumption and for other human purposes.

The conversion of Euphausids into whale blubber is a very inefficient process. I can thoroughly conceive of the possibility that we might wish at some future date to lower the stock of whales much below its level of maximum sustainable yield in order to preserve the yield possibilities of the Euphausids themselves. I think that as a general thesis we have to begin thinking about all of the predatory species of animals as we press harder for production of food from the ocean in the same manner that we think of grizzly bear, timber wolves, and coyotes in stockraising country. We should manage them for the best social interest of mankind generally.

Aglen: What I was going to say has been covered. My remark concerned the cultural aspects of the whales which has come to the fore because the countries involved did not apply the scientific advice and the principles of maximum sustainable yield and they have only just stopped that exploitation in time to give some of the whales anyway at least a chance of recovering. Had the maximum sustainable yield been worked out sooner and applied sooner, this particular aspect would not have come to the fore.

Chapman: And those respective countries have now been chastized sufficiently in public that they are shamefacedly withdrawing to another standard.

Question: I think one of the most important things that we heard from Mr. Kamenaga's paper was the frank recognition of the fact that each nation is obliged, each government is obliged, to recognize the needs of its economies and its people and this factor makes it extremely difficult, if not impossible, to impose any uniform rules applying to all nations throughout the world because we have no world problems, we have nation's problems and each nation has its responsibility to discharge to its own people; and for that reason one would make an assertion of claims which seems too broad to another but which is demanded by the needs of that country, and these factors have to be weighed along with the scientific problem in providing fisheries agreements.

Chapman: I think it goes one step further than is perhaps always recognized. When one sovereign people is negotiating with another sovereign people on a fishery issue it is the entire diplomatic weight of that one sovereign people negotiating with the entire diplomatic weight of another sovereign people. All of these diplomatic factors come into play and not just the fishery issue itself. This is not ordinarily understood. When Russia and the United States negotiate on fisheries problems, and they do so successfully in a variety of cases, this is done not on the basis of the fishery issue only but in the context of their total power relation and also their relations with their other neighbors. This is a factor that is not often considered.

Question: I understand there is a lot of agitation to extend the Japanese territorial limit.

Chapman: I think it is with respect to fisheries limit not to territorial sea.

Kamenaga: Yes. There is a strong desire, especially in Hokkaido, a northern island of Japan, because sometimes the Soviet expansion comes near to our territorial waters, and sometimes the Koreans--it has been only one or two times--say loudly that we are going to the north seas. Our situation is that we have already a twelve mile agreement between Japan and Korea, we have no serious damage by the Soviet vessels now, and at this stage our government thinks that there is no urgent necessity to establish a line twelve miles off the Japanese coasts. On the other hand, our fishermen have been operating within twelve miles of the Kuril Islands, still occupied by the U.S.S.R. The Japanese think those are Japanese territory, but many seizures of vessels have occurred because of Japanese operations within twelve miles of them. Our government's attitude on this problem is if we adopt twelve miles, our position to the Soviets will be weakened. For these reasons our government at this stage is quite reluctant to set a line twelve miles along the Japanese coasts.

Question: I think I understood Dr. Kamenaga to say that technology would never be an important factor in a nation's fishery development--low labor costs and high price were more important factors. Now, generally speaking, one function of technology is to lower labor costs despite the fact that the price of labor may increase; is it your point that fishing is by its nature such a labor-intensive industry that technology will never play a significant role in it?

Kamenaga: I think that technology is very important and, of course, technology can cover the higher wage to some extent by saving on human power. Surely the development of technology is very important but I said the level of wages would be a more influential factor in competition. That was what I meant. I don't want to ignore the effects of the development of technology but wage problems are more influential in conducting fisheries.

Question: I wonder if Dr. Kamenaga would comment on the use of subsidies in determining costs in the Japanese fishing industry.

Kamenaga: In Japan there is no subsidy for high-sea fisheries conducted by big fleets. Low-rate loans are available for coastal or medium-size fisheries only. We have big fishing companies and we also have very small fishing units. The big

companies have a large number of vessels and large capital investment, while the small fishermen have one or two vessels and small capital. Comparing these two, we will find their fishing technique is almost the same. A big company has many boats, but if we compare the operation of a single boat owned by a big company with that owned by a small fisherman, there will be no difference in actual fishing conduct. So I don't think that capital itself is so influential in the competition.

Chapman: I would like to add one thing to that if I may. I think the problem is the fishermen having access to capital.

Kamenaga: I want to add that for example in the fields of the textile industry big nylon industries have different techniques than the small cloth makers. They are entirely different in technique and also in the way they use labor. But in fishing there is not so much difference between big and small techniques.

Chapman: Speaking from the experience of a large company, one of the few advantages a large company has in this business is access to capital. A small fisherman has difficulty in getting capital. If he had the same freedom of access to capital as the large company has almost always, in the United States anyway, and also almost always in Japan, the individual fisherman-operated and fisherman-owned vessel is more efficient than the one employed by a big company. A new factor that is coming into this now on a world-wide basis is the injection of capital at the fishing level by the World Bank and other bilateral arrangements for aid to the developing countries. I think this is going to have a material effect on the development of fisheries in the developing world simply by making capital available to fishermen.

Jackson: To illustrate the point I will ask, do you think that the situation where the production equipment is very expensive, such as in pelagic whaling, that in this situation capital is not a very important factor?

Kamenaga: Yes. Antarctic expeditions need much capital, of course, and capital is a very important factor for the expedition. But I am saying that capital itself will not have a decisive influence in competition among the Antarctic whaling industries.

Crowther: I would like to get Mr. Kamenaga's opinion on a point that Dr. Chapman brought up in his introduction. He mentioned that as we eventually catch greater quantities of fish the size of the fish will decrease and the suitability for direct human consumption will also decrease, which means we will then have to convert them to animal protein. Is it your view that these small fish would be converted to a product such as the fish protein concentrate for direct feeding to human beings, or will it be used as fishmeal for feeding to poultry or cattle? Do you have any views on this subject?

Chapman: What he wants to know is if there is anything in what I said that as we go heavier in the fish production we will be using kinds of fish that are smaller than what we customarily use now. And if that assumption is true, do you think it will be used as fish protein concentrate for direct human consumption or as fish meal for chicken production, or for hamoboko (fishcake) or what?

Crowther: In other words, what is his view for the future of fish protein concentrate?

Kasahara: I don't think this question of fish protein concentrate has been really discussed in Japan as yet; they have never really thought of this as a big issue.

Kamenaga: It is a very difficult question as to the future of FPC because it is a new product. My guess is that when FPC is more widely used for direct human consumption, that will be the time when we cannot eat fish in its original forms. That means the food shortage would be much more severe than it is now

Chapman: I think the thing is that in Japan they use these products now in so many different ways, in fish cakes and so forth, that fish protein concentrate hasn't even appealed to them as yet.

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The subject of the panel this morning, I believe, is supposed to be the future trends in the world's fisheries. I will try to add a bit to that theme. A great deal of what I would have said has already been said by Dr. Kamenaga. I arrive at much the same conclusions he does, but the origin of these conclusions is perhaps a bit different.

I would, before speaking on this subject, however, like to put the situation of the New England fisheries versus some of the others in a little different perspective. In contrast to the rather depressed nature of the New England fisheries, and even of some of our West Coast fisheries, our tuna fishery is doing quite well. I think the average fisherman in the tuna fleet from California this year will share above $10,000. And we have a lot of young men in the fishery, and lots of people wanting to go into it. Also, I believe, the shrimp fishery is doing moderately well; and the sector of the United States fishery that is probably doing the best is that which is not operating from the United States, but operating in places like Peru, West Africa, and so on. I think that, therefore, when one regards the United States fishing industry one needs to think not only of the coastal fisheries but also of the distant water fisheries, the overseas operations, and the whole thing. This is just to put it in perspective.

First, I would like to talk about the nature of the ocean. I think that what we are trying to do here, when we are talking about future trends, is, essentially, to look at the boundary conditions of the way the world is, and the way fisheries are developing, that lawyers and government people will need to take into account in thinking about what kind of progressive development of law will have to be made in order to accommodate the needs of men. The facile analogy to "national lakes" is, I think, a very great over-simplification, because a lake is a piece of water, a relatively small piece of water, that is bounded by some land. These "national lakes" that are bounded by imaginary lines don't have such natural boundaries, and the fish in general do not observe them.

Again, in the fisheries there are two categories. Of the 46 million tons that Wib Chapman put on the blackboard, about 40 per cent are things like herring, anchovies, sardines, and so on; small pelagic fish. Some of them are inshore but many of them occur quite a way offshore. This 40 per cent, or perhaps a little bit more now, are small fish, low in the food chain, that are landed for less than $30 per ton ($15 a ton in Peru, about $20 in California, and menhaden are about $30 a ton). This is the sector of the fisheries that has been making most of the growth. The growth of 6 to 7 per cent a year we are talking about is largely in this sector. The high-priced fish, like tuna, and like the demersal fish that Tom Fulham makes a living on, have not increased very greatly.

Furthermore, the pelagic fish, including the tuna, don't stay in the "lakes." They tend to move from one "lake" to another over quite large distances. So that, for the demersal fisheries, where the fish don't move too far (although in some cases they do move quite a ways), you perhaps can set off a piece of ocean for yourself, but it won't do you a bit of good in the case of these other species because they will go over to the other guy's "lake" anyway. So the "national lakes" solution won't solve the problem in the pelagic fisheries, because the fish are in your "lake" today and the other guy's "lake" tomorrow. We are going to have to have some kind of a cooperative regime. I won't attempt to say what it will be, but we are faced with the way the world is put together. You can't fence off a stock of fish the way you can fence off a herd of cattle.

The general trend for the high-priced fish is for the catch not to go up very fast. Since they are a luxury product, which people like and will pay high prices for, the price and cost go up rather rapidly. This is also true of the kinds of things that we raise in fish farms. As Dr. Kasahara pointed out, in Japan most of the fish farming is simply converting cheap fish into valuable fish, and using up the cheap fish in the process. We do it here by putting the cheap fish through chickens. This luxury market will continue, certainly, and it is a very good way of making money. But the other problem, of getting cheap animal proteins to people, is going to be solved with those kinds of fish and other organisms which, as Chapman says, are low in the food chain, such as lantern fish and deep sea smelt. These mostly occur offshore, and are not connected with the land at all; they aren't coastal. I am sure that within the next twenty or thirty years there will be large commercial fisheries developing for them.

Another tendency with the low-priced things, and even with some of the higher-priced, is for the development of products where the raw materials are somewhat indifferent. For the luxury products, like halibut, lobster, tuna, shrimp, and so on, you are buying a particular kind of food because you prefer it. There is a continuing development of products like fish portions, and fish sticks, and so on, where we can make them from quite a variety of fish. There will be, certainly, development of other things, like fish protein concentrate, where the raw materials are indifferent. Of course, the very cheap material that we are using now--this 40 per cent--is largely going to fish meal that is routed through chickens, cows, and pigs. The raw material is almost completely indifferent. We make practically the same quality of fish meal from whatever variety of fish. I am sure there is going to be a tendency for increasingly heavy production of these fish going to many other products where the raw material is more or less indifferent.

An additional thing that is going on is the expansion of the distant water fleets, or at least fleets that are able to move from one area to another to engage in different fisheries. This is simply a matter of efficiency. Even with coastal fisheries, usually certain kinds of fish are easy to catch in some seasons and not easy to catch in others, and this is particularly true of the pelagic fisheries. So, in order to operate effectively, it is desirable where possible to have a vessel that can engage in one fishery in one season, and another fishery in another season, which makes it profitable to have somewhat larger vessels with more mobility than the vessel which only fishes, say, four or five months for a particular species in one locality and is then laid up. This is a general tendency around the world.

Another thing, of course, is that, as we are using more and more of the fish stocks, the need exists for more sophisticated conservation and management measures. We have largely confined our management to single stocks of fish.

As we get into fishing more kinds of fish, and particularly getting into products where the raw material is indifferent, we are probably going to want to manage for maximum yield, either in protein terms or in economic terms, from a complex of organisms in a given area. One example, of course, is the one that was mentioned in the case of the Antarctic whales. It may well turn out that one may want to harvest krill instead. It looks as though the stocks of krill will probably support, biologically, a harvest of something on the order of 100 million tons per year. We probably will want to harvest those, and only maintain a rather small harvest of whales. Similarly, I think that in some other areas one will probably want to have a smaller harvest of the expensive luxury products in favor of a larger harvest of the more productive things.

An analogy on land is that we used to harvest a lot of pheasant and a lot of wild buffalo and a lot of wild deer. It now turns out that it is more profitable, and more desirable, to maintain these as luxury products, to raise the pheasants on pheasant farms, and use most of the land for other, more productive, varieties of farming. I think that this is where fish-farming comes in: Fish farming, for the foreseeable future, will be for high-value things like clams and oysters and milkfish and so forth in inshore waters. The farming of the high seas will be more analogous to range management, that is where one is selectively harvesting, and eliminating some of the predatory and weed species, but not trying to fertilize the area, like you do on a farm, simply because of costs.

We just cannot raise any kind of meat for $30 a ton. The most efficient animal husbandry we have now is for chickens, highly selected strains on beautifully balanced diets, and with factory operation with very little labor, and the price at the factory for the chickens is about $250 per ton, or 12 cents per pound. We won't be able to raise any kind of fish for $30 per ton in the foreseeable future, and we can quite easily double or triple the catch of this kind of inexpensive fish around the world.

I think we are going to, as Dr. Kamenaga said, take some account of the economic returns in addition to the maximum sustainable physical yield. However, the models we are going to use will be a little more sophisticated than those the economists, in general, have published on. Many economists would have us maximize the difference between the gross revenue and the gross cost to the fishermen, that is the so-called MEY--maximum economic yield--as against the maximum physical yield. I submit that this is a bit of an over-simplification, because this maximizes the return only to the fisherman, and does not necessarily maximize the return to the industry, or maximize benefits to society. Think for example of those spiced anchovies that we eat on crackers. There are a number of inputs. One of them is the anchovy; another is the can; another is the spice; another is the salad oil; another is the capital value of the cannery, and so on, and the land that it is on. So the value of the anchovy in this case is a very small part of the value of the total product. One wants to look at the net return, taking all of the inputs into the product by the time you buy it, and all the costs, and maximizing the difference. The maximum economic yield of the whole business will be a function of the fishing effort, but will also be a function of the other factors. Well, I think the economists will agree that what we want to do is maximize the net economic yield of the whole process. This says, then, in mathematical terms--in geometric terms--we have a surface (a function of fishing effort and of other factors), where the relationship between fishing effort and yield is only a slice through it, and we want to arrive at that point where the surface is the highest. In general, the maximum for the whole process will <u>not</u> be at the point where the net yield to the fisherman is maximum. So I rather tend to agree with Kamenaga; for, in general, the maximum will almost never be at a level of fishing beyond the maximum sustainable yield, but it will quite often be at some value near the maximum sustainable yield.

Practically, I think what we are going to be doing is managing the fisheries with the maximum sustainable physical yield as a boundary condition. That is, we will establish the maximum sustainable yield, and then try to whack up the catches somehow between nations so that, within the maximum sustainable yield, each can attempt to take his share at the least cost; that is maximizing the economic yield within the boundary condition of the maximum sustainable yield.

<u>DISCUSSION</u>

Question: Dr. Schaefer, you commented on the trend to having multi-purpose vessels that will serve a number of different fisheries. I would like to ask two questions: number one, is it possible to construct a vessel that can be used at certain times of the year for research and for fishing at other times of the year; and number two, is it possible to obtain a federal subsidy for a vessel that is used in more than one fishery?

Schaefer: The answer to both of your question is yes. However, with regard to your second question, I was thinking about not only vessels that are engaged in different kinds of fisheries at different times of the year, but also vessels that engage in the same kinds of multi-species fisheries, but in different areas. The California tuna fleet is the most notable example. They catch yellowfin and skipjack tuna, and some albacore and bluefin, but they catch them all year, and they catch them in different places.

It is possible, of course, to engage in research part of the year, and to fish part of the year, but I don't think it is particularly feasible, because the needs of the two activities are sufficiently incompatible that you would have a large capital investment in idle equipment. When you weren't fishing, you would have a lot of fishing gear laying around, and when you weren't researching you would have a lot of scientific equipment laying around. I just don't think it is practical.

Of course, it is possible to obtain subsidies for a vessel engaged in a number of fisheries. I think that many of the vessels that are receiving subsidies now stipulate that they will engage in several different fisheries, for flexibility.

I would like to say also that this subsidy is not a subsidy for the fishing vessel owners; it is a subsidy for American shipyards. The only reason for having the subsidy is that it is illegal to land fish in the United States from a vessel that was built elsewhere than in the United States. This is pursuant to a law which was passed in 1790, or something--1792--to protect the infant shipbuilding industry of the United States. I think it might be wise to have another look, and see if this infant hasn't been protected long enough, and simply allow the fisherman to build his vessel

wherever he pleases. The subsidy is really not a substitute, from the fisherman's standpoint for repealing the law, because it takes a long time to go through all the paper work, and so on, to get the subsidy. Skip Crowther and his people have to spend an awful lot of effort, and man hours, on this, so that it represents a real cost to society of maintaining the subsidy, in addition to the subsidy itself. I am sure that most individual fishermen would be completely happy if they could just get their boats built at a competitive price in an efficient yard--in Japan, or Mexico, or the Netherlands, or the United States.

Question: Do you have any opinion as to why the West Coast tuna fishing industry is successful and the New England fishery isn't? Secondly, to you think the tuna position will have changed when large Russian fleets (in the neighborhood of 100 or more vessels) start getting tuna?

Schaefer: Well, I can give you one reason why it is successful, that is a sociological reason, but it is only part of the answer. The California fishermen are distant-water fishermen, and they go out on voyages that will last up to three months. The New England fishermen, by and large, don't want to go to distant waters anymore. They want to fish five days and be home for the weekend--ten days then. They don't want to make long voyages as they did back in the whaling days. Another element is that, fortunately, so far, it has been possible to maintain the tuna fisheries in a high state of technological efficiency, by adding kinds of fish-catching apparatus, and so on, which are efficient, whereas in the New England fisheries on many of the stocks which are fully utilized there are various kinds of gear regulations, and one thing and another, that tend to prevent you from using the best technological devices. These are only two of the factors, however. It is a very complex thing. Also the competition, that is the other people that are fishing tuna for the United States market, have to ship them from a long way, whereas Tom's competition is right next door. There is a whole complex of factors. It would take a whole day to even attempt to elucidate them completely. I was merely pointing out that different fisheries of the United States are in different conditions.

McKernan: I hope you don't mind if I disagree, Dr. Schaefer. I do not believe that there are fundamental differences in the attitudes of fishermen in New England and San Diego. I think that if the fishermen in New England could make money that they would go out to sea for any period of time. In fact, I am told that the new large stern-ramp trawlers that are going to be fishing in that area soon had no trouble in preliminary discussions about getting a crew. It is planned that they will be at sea several weeks a trip. Secondly, I think that technological changes have also been present and available to the New England fishermen and in fact to a greater degree than they have in Southern California. Technological changes affecting the New England vessels were not developed by United States fishermen, they were developed in Europe but they have been available. The problem has been in the availability of capital; that is, capital available in New England for the larger fishing vessels. Between New England and Southern California there is a great difference in the management of the fishing enterprises. In Southern California there is much more working capital available than there has been in New England, and the differences in profit between the New England ground fishery and the tuna fishery in Southern California are great. After the war our fishermen were using the old side trawlers; most of these side trawlers were in New England, and the foreign competition was using brand-new stern-ramp trawlers. Furthermore, they were shipping fish to the United States very inexpensively. It was difficult then to compete with the foreign fisheries and this problem has continued right up to the present time. That competition has been controlled to a considerable degree in Southern California. There is a high tariff on canned imported tuna; there is no comparable protective tariff on imported groundfish fillets. The heavily subsidized European fleet has competed successfully on the United States market where there was no comparable subsidy in the United States for the New England fisheries. The only reason I have spent this time is that I disagree with Dr. Schaefer about the technology. That is, technology hasn't come to New England because the capital hasn't been there to use it.

Chapman: I want to emphasize one point that Don made and that is that in many parts of the world the employment of United States government capital either to subsidize, or simply to make the capital available to developing fisheries elsewhere in the world, has been done in terms of hundreds of millions of dollars over the last twenty years, very large sums; but whenever a million dollar appropriation is wanted for doing something to assist indirectly the American industry it just isn't forthcoming. The amount that the United States government has spent in the development of fisheries overseas in the past twenty years is enormously greater than it has spent in the same period of years on American fisheries.

Question: Perhaps a comment on subsidy. We seem to ignore the tremendous amount of subsidies that every country, and especially the United States, is giving to all of its marine industries, including fishing, in supply harborage, docks, security services, weather information, communications, and all these kinds of things. Sea transportation and fishing might be compared in some ways to the trucking industry which doesn't pay for road services except through taxes; and I don't see how otherwise any product, even one for which the raw material cost is zero, can be laid down for $30 a ton. In the chemical industry there are a few products, ammonia for example, which are manufactured from raw materials of zero cost, and this is an absolute zero minimum, for $30 or $40. I think the investment cost of a fishing vessel, if you were to add the tremendous investment in harbor and so forth which I mentioned before, would be comparable. I have been wondering whether $30 a ton is really the economically correct one.

Schaefer: I would like to answer this. I think the extra cost of the harbor works and so on is very small. In Peru, the best example I know of fish being laid down cheaply, the cost is approximately $15 a ton for anchovetas.

Chapman: Well, it might run an average of 600,000 tons, an average cost of $12 per ton.

Schaefer: If, in Peru, you add all of the public harbor works, facilities, and so on, you will find that it wouldn't increase the cost very much; and, furthermore, included in this $15 a ton is a fair amount of tax that is added on. That is, the people when they make the fish meal itself pay a considerable amount of taxes which build most of the harbors. So this $15 a ton for the raw material in Peru is the real cost, and you couldn't get it higher than $16 no matter how

you calculate it. Similarly, in California, if it weren't for some institutional handicaps, we would be landing something on the order of half a million or a million tons of anchovies there a year at around $20 a ton, and, again, I am quite sure that the services that are furnished are offset by taxes that the fishermen pay (and in our county they pay quite considerable property taxes on their vessels, that help to maintain the streets and harbors). One could run up these numbers; I don't know if anybody has attempted to do it. This is the point, this is my whole point: the sea is a pretty darn good farm already. Off Peru, for example, the yield, if you take the area 1,000 kilometers along the coast, 100 kilometers wide--you are getting a ton of fish per hectare. In other words, about 800 and some pounds per acre. Well, you don't do better than that raising cows. I mean a metric ton per hectare, which is about 800 and some pounds per acre. It takes pretty good pasture land to raise cows at that.

Chapman: And he also provides the harbor works. What you do in this kind of fishery for harbor is find a headland some place which will cut the wind off during the fishing times of the year. You then build a plant behind the headland, in the shelter of that, and have a small barge out here into which you pump the fish from the vessel and pump them to your plant. You don't need harbor works at all.

Question: This is different from New England.

Chapman: Well, one of the reasons is that New England persists in being different.

Dykstra: There is another side of this question I wanted to go over. How large and systematic is your competition? We are competing not only with the fisheries; we are also competing with other products--agricultural products in our own country--and if we compare the subsidization of our agricultural products with that of the fisheries we will find there is no comparison. The same is true with regard to subsidization of fisheries of other countries as compared to what we have here in the United States.

I wanted to make another comment on Dr. Schaefer's talk. One thing I don't think has been made clear here (nor has it been brought out in other meetings) is the efficiency of the large stern trawler coming from a distance as compared with the coastal fishery. Everybody tends to think that this large stern trawler type of operation is more efficient. American vessels working on the same grounds and given the same opportunities the coastal fisheries have will almost always be more efficient than distant-water fisheries. I think that the United States vessels, though poor some may be, are generally more efficient than the large stern trawlers that are coming to compete with us. Other factors, such as heavy subsidization and other economic systems, make it possible for some of these people to compete with us as much as they do.

Now another thing I want to point out is that these vessels that come these long distances don't actually go out as far as you think in the middle of the ocean somewhere and fish. When they do come these long distances they fish on a localized population in the coastal area, off somebody else's coast, because this is where the fish are located. These large stern trawlers coming and moving around and going from one population to another really are not an efficient way, in my judgment, to catch these fish. There are various other reasons why these men come out and work on these populations. They don't have fish in their own waters oftentimes. I don't think that the large stern trawlers going from one area to another are efficient; it is a very difficult and expensive operation to mount. The unit itself may be efficient but the whole operation is not efficient.

Chapman: Jake, I couldn't agree with you more. The most irritating thing that I have happening to me day in and day out is people telling me why don't we get a modern and efficient fleet and get a great big stern trawler. The reason we don't is we would go broke because the darn things are inefficient. I wish we could get this through people's heads. You never operate with a big vessel if you have a shore base close to the resource where you can use a small vessel. You never do it, and neither would the Russians if they had a base over here.

Question: In response to a remark made by Dr. Schaefer, I was wondering if you have an individual fisherman making the maximum in profits or a large company which handles the fish right through the sales, whether your maximum economic yield is going to be the part that you are looking at; so that you can get your return on your investment in order to keep your company going. So your MSY is going to be just another factor in your net MEY.

Chapman: Yes. That is the way the theory goes. My company is the biggest fish company in the United States and we just can't operate that way. We have tried to two or three times. The theory is real good but it doesn't work. The reason for this is, essentially, that the individual fisherman operating a vessel from which his income from vessel operation is a large part of his total income pays such good attention to the vessel and its operation that he just beats the pants off us and the company hiring people to run the vessel.

Furnas: I could add to that also that if you run a vertical operation where your fish is sold at auction and you own both the vessel and the fish, depending on the prevailing market conditions at the time, the question is do you lower the price so that the boat doesn't make money or the processing plant does or vice versa; and that was one of the things that really hurt the New England fishing industry when they had vertical operations.

Schaefer: I would like to comment on that, sir. My argument wasn't for a vertically integrated company. I was simply looking at what is the maximum return to society, whether the mix is all one company, or fishermen with processors, and so on, buying the fish. The ordinary argument, you see, is the argument as to what is the most efficient thing for society as a whole; and this is why economists have advocated limited entry, so that you are not dissipating the revenue by overcapitalization. I was merely saying that when you take <u>all</u> of the factors together the maximum net economic yield of the entire operation, even though it may involve different companies, will, in general, be at a different point than the maximum net economic yield to the fisherman.

Thomas A. Fulham
Boston Fish Market Corporation
Boston, Massachusetts

I want to commend Mr. Kamenaga for his very sensible and temperate remarks. I wish that I could be that temperate. Mr. Chairman, fellow panel members, fellow students, I must confess to being somewhat over-awed by the weight and quality of the scholarly thought that has been profounded here this week. Speaker after speaker has defined and exposed problems that will be years of work for somebody. Quite frankly I find little comfort in many of the solutions. For I am one of those pragmatic people that Professor Goldie referred to yesterday. If it were not for the presence in the audience of Jake Dykstra, a fellow commercial fishery sufferer, I would probably feel quite alone. I may have another ally. I am not sure. We don't agree on most things but if I were able to decide whether Dr. Chapman is an academic capitalist or a capitalistic academician there could be some possible support in this area. This morning I turned on the TV in my room and was greeted as follows: "At the current session of the Law of the Sea Institute at the University of Rhode Island, Dr. W. M. Chapman says, "Sea food executives cause more problems than they solve." That evidently was the most weighty thought to come out of this conference.

On the principle of equal time may I respond as follows: "Lawyers, professors, and scientists in concert cause more problems."

It is difficult for me, a provincial business man, with only small exposure to the problems of international fishery, to maintain the objectivity which is needed for the subject of this conference and which usually characterizes the governmental and academic points of view. The overriding necessity in commercial fishing to seek a harvest adequate to support the capital investment and current costs plus the further obligation to earn an appropriate return is a firm deterrent to global thinking. If you will bear this in mind you will not object to me confining my comments to the areas that are most familiar to me. My participation is the New England commercial fishing industry and I have been at it a fairly long time by ordinary standards--thirty-four years. To this you must add two preceding generations at the same activity and that combines to erect a point of view which is not only concerned but emotional. In this framework I find it difficult to go beyond wondering just where the local New England fishery fits into the world picture. However, it appears that our situation is very similar to any other non-mobile coastal fishery.

As it has been described earlier in this conference, the major conflict between the large, well-financed mobile units, whether they be governmental or privately financed, and the local non-mobile fleets is being waged on our New England doorstep. Conservation on a multi-lateral basis through the International Commission for the Northwest Atlantic--with strong New England support I might add--has been operated on our shores for approximately fifteen years. The net result has been just short of disastrous. Our landings are down, the areas of operation have been squeezed to something less than half of that which we exploited ten years ago, and far more important than this factual recitation, the attitude of our fishermen toward the future is most pessimistic. I could probably add a personal note at this point; in about two weeks I will be called upon to sign a contract to build a stern-ramp trawler which will cost in the vicinity of $1,000,000. This will be a very efficient vessel, there is a market for the product, there is very little local competition, the government has supported me with a subsidy, but now the question is do I, on the basis of what I hear here and in similar conferences, go ahead and sign that contract. I think that if I would move strictly on what I hear I would probably never sign the contract, but I just have the feeling that things will come along for the better and it might be a good idea.

This classic picture of competition in our local New England fisheries for an excellent but confined resource must, of necessity, be repeated in many locations all over the world. I have heard several times at this conference references to large trawlers travelling 3,000 to 4,000 miles and you somehow get the idea that they fish all over that 3,000 to 4,000 miles and this is not the case; they actually come to a small deposit of fish, fish it out, and move on to another. The Central and South American countries have most certainly taken notice of this turn of events and have reacted by unilaterally extending their fisheries jurisdiction far enough from their shores to offer a measure of protection to their own nationals. I choose to neither defend or condemn this action within the framework of international law or treaty obligations because I am not competent to do so. But most certainly it is one method of protecting their native industry for their nationals before there is nothing to protect. It is my belief that this form of action will be imitated many more times by emerging coastal states before any activity of the United Nations or any other multilateral treaty convention can be brought to bear successfully on this problem. It is unfortunate that the regulations and the international enforcement procedures currently in force in existing conventions or under consideration could not have been enacted without loopholes and multiple reservations before we arrived at the conditions which exist today.

Such, however, is the fact of the matter and I doubt sincerely that those nations who are prospering under the current conditions will ever yield their strong positions to receive a lesser share under an arrangement which is less advantageous to them. This will not be done even under the highly respected canopy of conservation. So if I am to make any predictions about the future of world fisheries, and I was instructed to do so according to my letter of invitation, it is my opinion that sooner or later the oceans of the world will be a vast checkerboard of national jurisdictions--the contiguous nations joining in bilateral or trilateral agreements to define boundaries, catch quotas, fishing power regulations, and any other applicable biological or economic rules which can preserve those fisheries in their adjacent waters for themselves.

To place this power and discretion under the United Nations or any other supra-national governing body would be quite unworkable. The mechanics of administration, the cost of the necessary research and, especially, the division of the spoils, to be even satisfactory would require a single or group intelligence which up to now does not seem to be available. Add to these objections the absolute necessity for each nation to submerge its own economic and political interests without reservations for the good of some other nation for which it might have had a traditional hostility, this is asking too much.

I wonder how many of you have had the unique experience of explaining in some form the outcome of a lengthy international commission meeting to a group of fishermen, including those who own their own vessels. Believe me, this is where the buck stops. The feeling that there is endless time for research, that we can stumble along solving an interminable series of small problems as they arise, or convene a conference at some distant point in the future to deal with formation of a new and more effective commission may be allowed only in the classroom or in the laboratory. The economics and politics which attend the impact of mobile fleets on the coastal fisheries will force action long before what might appear to you to be a rational solution can be undertaken. Sooner or later the deliberations of this meeting and meetings of its type have to be reduced to the practical applications of commerce or to the working bureaucracy. If you assume from my remarks that I do not feel that meetings of this type are useful, necessary, or desirable that is not the case. This meeting is not only useful it is essential to provide the considered opinions to water down those actions which will be framed in haste and enacted because the future will be considered to be less intolerable than the present.

In conclusion, may I urge you that if you have a practical and workable solution other than "national lakes" it would be an excellent idea to promulgate them quickly.

DISCUSSION

Question: I can understand that your landings are down. I don't understand why the area you operate in has been squeezed.

Fulham: Actually it is the competition for the existing grounds and the fact that as our fleet has diminished we have really less need to go farther. If you will take a little local example here at Point Judith, which used to operate on the red hake, there is no sense for them to go back out there for them any more because there isn't any there left for them.

Chapman: I think also, Tom, it is a fair thing to say that in 1949 the Executive Branch of the United States government, at the level of the White House, sold you down the river and attempted to cut your throat. They told you that you were not needed and that has had some effect on the economy of your business.

Question: I would think that using your analogy there that sometime in the near future the seas will be divided up something like a checkerboard so that each nation will have areas for its own fishermen with the result that there will be a very inefficient use of fishery resources. For example, using the analogy of world trade, many of the economists are talking and practicing free trade. So the same thing should occur, I would think, with respect to the exploitation of the sea's resources, the sea should be as free as possible for exploitation so that the most efficient exploiters could come in and gather resource.

Fulham: The only thing I could say to that is that we all more or less agree that the resources of the ocean will be in demand. If that is so, then the only efficient way to manage this particular resource is by the marine biological knowledge that has to be gathered plus efficient enforcement of the regulations that will be promulgated. For example, let us take the situation that the fishery resources of Georges Bank were divided up between the United States and Canada; I am sure that the Canadian and American biologists could get an excellent working arrangement going and that as far as enforcement is concerned it would be extremely simple. I don't know how we could enforce regulations in that area now.

Question: What kind of a fishing vessel does $1,000,000 buy nowadays?

Fulham: It buys a 131'9" stern trawler with a 1,350 horsepower engine and sufficient electronics to fish.

Question: My ignorance. Is this a big vessel?

Fulham: No. That is a small vessel by world standards.

Chapman: I would say it is modest-sized.

Fulham: We are talking about 200 tons against 2,900 tons on the same bank.

Question: I was curious about this since the fishing industry is not what they call a capital intensive one.

Fulham: It all depends on whether you have the money or are trying to raise it.

Chapman: Well, sir, fishing vessels run in cost from a few hundred dollars up to about $10,000,000. I think the very large Russian vessels run at least $10,000,000 and, as Dr. Schaefer was saying, in the tuna business now the vessels being built are costing between $1,500,000 and $2,000,000 each. From the trawling standpoint the $1,000,000 vessel Tom is talking about is small from the standpoint of the European trawlers; but it is fairly good-sized from the standpoint of existing American trawlers.

Question: Can this type of vessel be used for what you refer to as mobile fishing operations or long-distance fishing?

Fulham: No. This is strictly a coastal fishery boat. It is to be used for the purpose of catching high-priced fish for the fresh fish market for the people who want to pay $3.25 for a broiled scrod dinner.

Aglen: I just wanted to say that the size is largely determined by the depth of the water you want to fish in. The large distant-water vessels usually are in much deeper water, not always, but the 130 or 140 foot vessel is useful out to 100 fathoms or a bit more.

Chapman: The essential rule is that you never use in a fishery a larger or more complex vessel than you absolutely need. If you are in close to shore or shallow water you use small, simple vessels; if you are going to go 5,000 miles away you have to have part of a city along with you.

Kasahara: A 200-ton Japanese boat fishes down to 600 or 1,000 meters. It depends on the winch and the power you have.

Herrington: If you had a 3,000-ton vessel, then including capital costs and operating costs could you produce fish at a lower price per pound than with the vessel you are planning on?

Fulham: You mean a large vessel? You get int another situation. Actually the only reason that our local American fishery can exist at all is because of the fresh fish factor. When you get into a 3,000-ton vessel you are talking about a floating fish factory. The minute you do that then you must operate on comparable labor standards to anyone else who produces frozen fish at sea because that is an international commodity and we absolutely could not begin to compete in the labor market.

Herrington: The size of your equipment is not the answer to your problem?

Fulham: No.

Question: I have heard very little mention of individuals entering the fishery industry. Will you comment on that?

Fulham: We have a very serious situation in that regard. The average age of our fishermen is fifty-seven years of age. The normal supply of fishermen for our fishery came from the Maritime Provinces of Canada, from the Scandinavian countries or from Iceland in years past, from 1935 up until World War II. They will not come to this country now because in order to go fishing they must take out first papers and the minute they do they get drafted. So they won't come. With the possible exception of a few sons of fishermen and one person or another entering the fishery we have a really poor situation. It is hoped that in the future we can do something about fishing vessel accommodations and the life aboard the vessel, raise the annual income, and we might be able to maintain a fairly reasonable fishery. But I see no tremendous expansion.

Chapman: It should be kept in mind with respect to his fishery that what we were referring to a little while ago is that back in 1948, 1949, and 1950 there was a deliberate decision on the part of the United States government to disfavor the New England trawl fishermen vis-à-vis the Canadian, Icelandic, and Norwegian fisheries. The consequence of that was that the economic ground was cut out from under them and they have been hampered ever since. In Canada, for instance, there have been for some time large subsidies for vessel construction by both the provinces and the federal government, and various other aids that have not been forthcoming from the United States government to the New England industry. The fishery to which Mr. Fulham refers is our oldest and was up until about 1946 our strongest fishery economically. It has been deliberately degraded by the policy of the United States government and it is not typical of all the fisheries of the country. Some of our other fisheries are in somewhat better shape.

Herrington: Mr. Chairman, I would like to challenge this statement. The United States government on the basis of overall interests and trade policy turned down proposals to establish or increase tariffs or quotas on North Atlantic fish. I would not call this deliberate degrading of the New England industry.

Chapman: Well, Tom can speak for himself, but the effect on the vessel owner was precisely identical.

Herrington: I agree on the effect but I don't agree on the description of the intent.

Fulham: I am afraid we are going to have to rely on the effect more than on the intent. There were actually many things that did contribute to our difficulty. Of course, the tariff thing was very important but also following World War II under the Marshall Plan there was tremendous aid given to foreign fisheries, such as the construction of freezers in Iceland and that type of thing, which contributed very materially to our difficulties.

Question: You stated that the basis of the New England fisheries is the fresh fish market. I wonder if you would comment on the element of irradiation preservation.

Fulham: Yes, I would. I think that there is quite a future at some time when the Atomic Energy Commission decides that the radiation source can be made available. At the moment a quantity about the size of this letter case here costs about $280,000, which is a little bit too much. But I do think that when the price does come down there will be a possibility in the luxury food class where radiation can be employed to send fresh fish further into the country, but you are talking about luxury food.

Question: Would there be importing of radiated things?

Fulham: That is quite possible. We are currently working on a piece of legislation to see if we can erect a tariff barrier before that happens so we won't get clobbered again as we did in 1947.

FUTURE REGIME FOR HIGHSEAS FISHERIES

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United Nations Development Programme
New York, New York

1. It is assumed that the regime should be a practicable one in the light of the existing political, economic, and social conditions of the world. I further assume that, under the regime, it should be possible for the world's total fishery production to continue to expand at a fairly rapid rate. My consideration is limited to what might be done in the next twenty years. Due to a number of uncertain factors, prediction beyond this range is not possible.

2. The regime which I envision consists of the following elements:

a. An overall recognition, de jure or de facto, or an exclusive fishing right zone up to twelve miles.

b. Increasing regional arrangements among the nations fishing in the respective areas as well as the coastal states concerned. The principles under which such arrangements are made may vary, depending on the biological characteristics of the resources under exploitation, the stage of development of the fisheries in question, the interests of the nations concerned as well as the organization of their fishing industries, etc. Actual arrangements made will not be entirely satisfactory to any of the parties involved but should generally contribute toward minimizing international disputes, avoiding the disruption of major fishing activities and maintaining yields from the resources concerned at levels higher than they would be without such international arrangements.

c. Either included in the arrangements mentioned in (b) above or separately therefrom, international agreements to minimize direct physical interference in fishing operations on the high seas, which would be reviewed periodically and revised to keep pace with the development of fishing technology.

d. Under the Convention on the Continental Shelf, specific agreements between the nations concerned as to the division of the shelf area and the precise definition of the species to be covered by the Convention.

3. The main problem for the above-mentioned regime, or any other regime of an international nature for high seas fisheries, would be an increasing number of nations claiming broader exclusive fishing zones.

4. For a variety of reasons, I do not think it is feasible, in the foreseeable future, to have high seas fishing rights vested in a single international organization, which would assume full responsibility for the management of fisheries, including the issuance and transfer of licenses, the adoption and enforcement of conservation measures, the coordination and/or implementation of research programs, and so forth, although this kind of arrangement might be worth considering in some special cases, e.g., Antarctic whaling.

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* The views expressed in this paper are those of the author and do not necessarily reflect the views of the organization to which he belongs.

DISCUSSION

KASAHARA: As to the question of having all fishing rights vested in a single international organization which would assume full responsibility for the management of the fisheries, including the issuance and transfer of licenses, the adoption and enforcement of conservation measures, the coordination and/or implementation of a research program, and so forth, I do not think this will become feasible within our time any way. But I would not exclude this possibility entirely because it might just be possible to have this kind of an arrangement for some very special cases and one example I can think of is Antarctic whaling. The main problem for the above-mentioned regime or any other regime of an international nature for high seas fisheries would be an increasing number of nations claiming broader exclusive rights zones and I think in order to have any effective international regime you just have to deal with this problem in some way.

MCKERNAN: I would like to have an elaboration of your second point [of the summary statement].

KASAHARA: These arrangements include many different types. There exist already a great variety of international arrangements for the management of high seas fisheries ranging from an almost complete unilateral jurisdiction over certain stocks to a complete lack of international regulation, and in between we have perhaps all possible kinds of arrangements. Taking Japan as an example; between Japan and Korea there is a mutually recognized twelve-mile limit and an international zone in which the amount of fishing is limited, and there are many other arrangements under this treaty. Between Japan and the U.S.S.R. there is a very strict high seas salmon arrangement under which an overall quota is set by the commission which in turn is divided into sub-quotas for different sectors of the salmon industry and even for different operating units. We have a wide range of different international arrangements, some of them are implemented by international bodies such as fishery commissions; some others are implemented directly by the governments. So my point is that there will be more and more of these arrangements among the nations directly concerned with fishing in specific areas or for specific stocks, and we cannot have an overall principle to govern all these arrangements except perhaps we all wish to maximize physical yields. But my criteria in this respect are that such arrangements should contribute to minimizing disputes and avoiding the disruption of major fishing activities, and that it should also contribute to maintaining yields--physical yields--from the resources concerned at levels higher than they would be otherwise. Beyond that the countries directly concerned could have arrangements suitable for the conditions under which their fisheries operate.

QUESTION: I am not sure I did understand correctly. Did you indicate that you felt that the various nations should define the seaward limit of the littoral continental shelf in such a way as to indicate a boundary line and at the same time list the various sedentary species included within the definition of the shelf and as creatures of the shelf.

KASAHARA: [Concerning stocks on the continental shelf.] There is really no need for going into this unless some problem arises. Now suppose some country starts fishing some sedentary species off the coast of the United States and the United States under the Convention on the Continental Shelf claims that this is their stock. Now at that time these countries should enter into negotiations and define what species might be considered to be covered by the convention and actually they have to define the area too, to what depth and, if the countries are neighboring each other, by what dividing line. In other words, problems should be dealt with by the countries concerned as they arise.

STANG: My question concerns the United States-Japanese king crab agreement off Alaska. As I understand it the United States, instead of insisting that the area within the bounds of this agreement form part of the boundaries of the United States continental shelf, simply asserts that this area is within the United States continental shelf and thus there need not be any concern with boundaries. The concern is only with a resource located within a defined area and that is all that needs to be covered regarding boundaries in such an agreement. Is that correct?

KASAHARA: I agree that, if a species does not have an area of distribution any deeper than 200 meters, then there is really no need for defining the outer limit of the continental shelf to be applied in this case. So my approach is completely pragmatic.

CHAPMAN: You create problems and the essence of the solution is that you try to deal with the problems as they arise and try not to create any more new problems than are necessary.

Francis T. Christy, Jr.
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I will try to be brief because much of what I will say here I said before in last year's Proceedings, and because many of the previous speakers have already demonstrated very ably the problems of fishing a common property natural resource and of the gross economic inefficiencies that occur in the utilization of this shared resource. For example, there was some discussion earlier about the relative efficiency of the tuna industry against the efficiency of the New England fishery. The reason for the difference is quite simple: that the tuna industry on the West Coast has been operating largely at the point where they have been increasing their yields or reducing their costs. Costs were reduced by the innovation of the purse seine and the power block. Further significant innovations are unlikely and now they have reached the point where there is a restriction on the amount of the resource that they can get, at least with respect to the yellowfin tuna. A quota agreement has been signed, so that after the fish catch reaches 70,000 tons, or whatever it is, all fishing must stop. As more vessels enter the industry, each will get a smaller share, and net returns to the industry will decrease. It is likely that the efficiency of the tuna industry will begin to decline and may soon match the waste now evident in New England.

The rationale for discussing the alternative regimes lies in two aspects which have been touched upon here. One is the question of the supply. What do we really mean by the supply of fish from the sea? If the resources are so vast that all can win and none can lose then there is obviously no problem. The figures of 200 million or 4 billion tons of fish per year indicate that there is indeed a vast raw material. But to me it is a red herring--to use the term advisedly. These figures are not economic. Our discussions have already indicated that the supply is indeed limited, that there is congestion occurring in many fishing areas and that this congestion will continue to increase. The question as to how much biologic potential we have in the ocean is as irrelevant as the question of how much gold there is in the ocean. What we are really concerned with is the specific demand for specific kinds of fish. To be sure we may turn to some of the smaller kinds of species for protein concentrate. But this will not relieve the pressure on the already over-utilized species and will, inevitably, lead to excess pressure on the newly-developed resources, unless entry controls are adopted.

At the same time, the demand is increasing for both the high-valued and the low-valued species. And as this demand is increasing we find also the incentive to appropriate or perhaps expropriate exclusive rights to various areas. This is reflected in the desire to extend our limits out to twelve miles or even beyond. As demand increases and as technology reduces the cost of catching fish, the incentive to acquire exclusive rights increases more rapidly. That leads to the second point, the point of timing, and why we should be discussing the alternative regimes now.

There is, indeed, as some people here have already stated, a tendency for nations to extend unilaterally their rights and to acquire national lakes even though fish stocks do not respect the boundaries. This reduces our freedom of movement and our freedom of choice. I think we need urgently to discuss the alternatives to this kind of approach.

Now, let me turn briefly to what I think are the two major aspects of discussion. One aspect is the most efficient use of the resource. And the other aspect is the distribution of the resources, the distribution of the wealth of the sea. These are two quite separate problems but they are indeed related. I think it is important though to keep them separate in the discussions. I won't go into the details on the efficiency of the use of a resource because this is amply stated in the literature. Briefly though we have a common property resource, one that is shared--there is open access to it, anyone who wants to can go in and fish and no one can prevent the other people from doing so. Under this kind of condition there is no control over the amount of labor and the amount of capital that is employed in the resource. The indications of the degree of waste were provided by Crutchfield in the paper read earlier. What happens is that economic rent or sharable profit is dissipated; no one gets it. The fishermen don't get it; society doesn't get it. It is just a sheer waste. This can only be produced where we control the amount of entry, the number of producers, the number of fishermen, as if we were operating on the land resources within a free enterprise system. Such controls are essentially the establishment of property rights, of a degree of exclusive right to the resource. If the control is established through some form of license fee or bidding mechanism, society gets the economic rent that is now wasted. The fishermen remaining in the industry are no worse off than before, because the additional revenues obtained by the removal of redundant effort should be greater than the cost of the license. There is indeed a transitional problem as the excess amount of effort is removed. But there are ways for ameliorating these problems.

The discussion we have had between the maximum sustainable yield and the maximum net economic revenue is becoming really somewhat academic. I don't think that any economist who has studied the field would insist upon restricting effort at the point of the maximum net economic revenue in view of the great pressures to operate at the point of maximum sustainable yield. The critical point is how can we reduce the costs that are applied to the fishery at whatever level of yield is selected.

There are, of course, a number of difficulties in controlling the amount of effort and many of them have been stated here and many of them were stated last year. There is the possibility of reaching the second best solution. To do this it is important to find out how other people view the resource and to point out that there are ways in which we can reach agreement that will leave everyone better off than under the present arrangement, even though they may not be better off to the maximum degree. But even if we discount and refuse to accept the goal of least cost, the question of entry limitation still rears its ugly head. This is evident again in what Crutchfield said earlier with respect to the North Atlantic--both the Northwest and the Northeast Atlantic. The fishermen who have been participating in that fishery have continued to get declines in their catch per unit of effort and this is inevitable. The stock is limited and as more vessels come in each one gets a smaller share. So even the fishermen themselves have become concerned about the excess amount of effort and they are beginning to figure out that we do, indeed, need to control the amount of effort that goes into the exploitation of the resource. And this raises the nitty-gritty question, how are we going to reduce effort? How are we going to minimize congestion? I noted that one of Mr. Kasahara's points was that we should indeed

minimize interference or congestion. How can we do this? Who are we going to exclude? This raises the question then, as I said, of distribution. Who is going to get what? Who is going to be permitted to operate and who is not going to be permitted to operate? Now what are the criteria for this? Crutchfield again indicated that there are no objective criteria. We don't have any economic answer to it and we don't have any biological answer to it.

I think that the major criterion, which is not objective, is that of acceptability. What is going to be the most acceptable distribution of the right to participate in a fishery? There are several bases for this kind of distribution. One, as we have heard, is unilateral; we simply extend our rights out to the mid-points of the ocean and I do not believe this to be a viable kind of an arrangement. The next one is through historic rights, and this is what Crutchfield was suggesting with respect to the North Atlantic--that we divide up the pie on the basis of how people have been using it or may anticipate using it in the near future. This is a very dangerous principle to establish, dangerous to the interests of the United States. We fish in the areas close to our shores with the exception of a few fisheries such as tuna and shrimp. We do not fish in the vast areas of the ocean. If historic rights becomes accepted as the principle for the distribution of these resources we might find ourselves forever foreclosed from participating in vast areas of the oceans. How would we divide, for example, the areas off of Southwest Africa where United States fishermen do not directly participate. The Soviet Union and the Japanese have extended their efforts throughout all corners of the world. If historic rights is to be the basis for distribution the United States, I think, will come out second best. Now if, for example, we come to some sort of an agreement in the North Atlantic--Northwest and Northeast Atlantic--with respect to the distribution of the spoils and the establishment of national quotas, what does this mean to those who are prohibited from participating because they have had no historic right? Do the nations--the fifteen or more nations that are fishing in this area--have indeed a right to divide up this resource amongst themselves without respecting the interest of the other nations of the world? How viable would that agreement be over the long run?

There is a third approach to this question of the distribution of the revenue, and that is by some sort of international sharing of the rent, of the profit that can be produced by the control on the number of producers. This in a sense is similar to the fur seal treaty, in which the non-producers, those who are excluded, are bought out. They are paid a certain fee for not participating, for giving up their free right of access to the resource. Such an approach might well be taken on a regional basis, as was suggested by Dr. Kasahara with respect to the Antarctic whales. It might be done on a regional basis in the North Atlantic. There is no reason why it has to be a purely global regime initially, but inevitably the world's interests in these resources have to be respected and I think some sort of international approach must be adopted.

DISCUSSION

Fulham: I am sure there must be questions. I am going to take the chairman's perogative and ask the first one.

The reference to this distribution--Dr. Schaefer used the expression "whack up the total" and former speakers spoke quite a bit about distribution, my question is, what god-like person or group of persons is going to make the decision on this distribution? There is a vague reference to an international body. I think if we referred it to the international bodies that are currently in existence (which have great difficulty in making fairly small decisions to govern themselves), I find great difficulty in projecting beyond them to the omniscient person or persons who are going to do this. I would appreciate some enlightenment.

Christy: Let us say, for example, that we are dealing with the whales of the Antarctic through some sort of international authority that has the right to the whale resources and also the krill resources. As a separate point which was raised earlier let me simply make the remark that we cannot maximize the sustainable yield of both the whales and the krill. We can have a maximum yield from one or the other, or a less than maximum yield from both. The choice should depend on the relative economic values of the two species.

Now, if we have an Antarctic authority operating and it leases rights to fishermen to operate for the krill and/or the whales, it would acquire a certain revenue. The only criterion for revenue distribution would be acceptability. I don't think it would be acceptable for the general support of the United Nations, for example, since this might support peace-keeping forces. I don't think it could be distributed to individual states very well on the basis of length of coastline, or population, or need. I do think, however, that it could be turned over to some general purpose which would be acceptable to most nations of the world as a general humanitarian goal, perhaps for the development of science in the ocean or for the overcoming of protein malnutrition.

Herrington: In the course of this conference there have been a number of references to the fur seal convention, some rather favorable ones, that it sets a good example. Mr. Christy has done so but I believe he has drawn an erroneous conclusion regarding the nature of that convention. As I understand it, in this convention the division of the fur seal hides--the part that goes to Japan and Canada--originally was due to the fact that they were giving up something that they had established. They had an established industry and they gave this up; they abandoned the boats and they had to find other jobs for the seal hunters. Now if you change this and say that the compensation is because they gave up the right of access, which they had simply by being a nation, then every country had this right of access and every country would be entitled to a similar share. I doubt if the parties to the fur seal convention would say that every country is entitled to a share of the fur seals simply because of the fact that it is a sovereign nation. If you adopted this idea I think the fur seal convention might go to pieces. I call the sharing of the fur seals a formula based on historic share and not on the right of entry.

Christy: Yes. It presumes that the fur seals are indeed the property of the four nations that are signatory to the agreement. There is a presumed exclusive right. The fur seal division would never have worked if the parties had anticipated other people coming into and participating in the fur seal fishery pelagically. Now what, for example, would happen if the South Koreans, who have--under the current principle of the freedom of the seas--every right of access to the fur seals on the high seas, chose to exercise this right? What would happen if the Peruvians chose to exercise this right?

Herrington: If Korea came in and got a share I am sure that other countries would consider this a source of income requiring no effort at all and this idea would spread like wild fire through the world and everybody would get a piece of it and there wouldn't be any pieces left for anybody.

Christy: Exactly.

Herrington: Oh, then you concur this sharing under the fur seal convention is based more on historic sharing in the fishery than on the right of entry?

Christy: Are you suggesting that we divide up the ocean on the basis of historic rights?

Herrington: No. I am simply trying to make clear that the allusions to the fur seal convention I believe have been based on an erroneous interpretation of the principle underlying that settlement.

Question [directed to Mr. Christy]: How would you propose that licenses be issued--on what basis--if an international organization were to control the entry?

Christy: Well, I propose that the basis for the distribution and the privilege to operate be an economic one. That is, through an auction system, just as we auction rights to explore and exploit oil in our continental shelf we should auction off the right to fish and this would produce the greatest revenue that could be gained from this kind of an operation. Obviously, if this system is indeed operated it will be constrained by the same kinds of constraints that operate in the rest of our free enterprise economy whereby certain restrictions are employed to meet certain so-called needs, which prevent us from reaching the full rational economic goal. This does not bother me necessarily. If it is desirable to redistribute income by employing a labor force inefficiently this does not necessarily bother me if that is what society chooses, so long as society is aware of how much it costs to do so. But I would hope that we could begin at least with a rational economic scheme and then constrain it as society chooses.

Now the second question was with respect to the acceptability of this. I think this is a long-range proposition. The question of acceptability will be raised when the studies currently being undertaken with respect to the North Atlantic come out and are discussed. That is, initially it may be that the participating nations in the North Atlantic fisheries would attempt to, and probably could, divide up the pie through national quota schemes. At the same time this may precipitate some kind of discussion from the non-participating nations since they would be precluded from entry into that fishery.

McKernan: I would like to comment because I see some problems with the logic that Chris uses in coming to his conclusions. First, let me say that I have reached no conclusion in my own mind as to whether this idea is a good one or not. I do object to the way he reaches his conclusion because he spoke of three possibilities for some sort of world order, and I agree with the gentleman behind me that it is important to find some sort of world order. Extending the limits of national jurisdiction is one kind. Chris rejected this; he did not think it was a very viable solution. Earlier in these sessions, he said that he did not think that Russia would ever accept it and I mentioned to my legal friends here that if Russia was the only country in the world that didn't accept it I think that probably soon it would become international law and they would be forced to accept it.

With respect to his second point about dividing up the resources in the North Pacific or other parts of the ocean on the basis of our history of catch, he used an interesting expression here for discarding it; he didn't think it "was in the United States interest." He didn't use that same expression in either the first case of extended jurisdiction or the last one. It seems to me that this is a very interesting statement and I wonder why we don't first think about what is in the long-range United States interest--not short-range, not intermediate-range but in the long-range United States interest--and from that then couldn't we go forward and decide whether or not extended jurisdiction from a country situated as we are with a very great coastline with the ocean divided up as he divided it, wouldn't give us quite an advantage over most countries of the world?

He also used the term "acceptability," which I also like. Maybe that wouldn't be acceptable, but when the gentleman from my right asked him about whether he thought the business of sharing, of putting the resources in the hands of an international regime was acceptable, at least to me, Chris, you gave a sort of fuzzy answer. I would be inclined to think that the chances of either of the other two being acceptable are much greater.

On the basis of some historic division of the catch or on the basis of extended jurisdiction, it is probable that the world, at the present time and in the foreseeable future, would be much more apt to accept either extended jurisdiction or some historic division than they would some international body dividing the resources or making them available under some kind of a lease basis. Thus, it seems to me that the direction most desirable from the standpoint of the United States would be first to identify what is in our own long-range interest, not talk about criteria and not jump so quickly to one particular solution. And then, secondly, attempt to work out some legal regime which would lead us towards this long-range interest of the United States. We might end up exactly where Chris predicts, but it is not clear to me yet from arguments here or Crutchfield's arguments or any of the arguments that have been put forth yet in the literature that I have seen, that a good case has been made for any of these systems at the present time.

Christy: I didn't discuss the United States interest with respect to the national lakes approach because I thought that the other arguments that have been raised here against it were quite obvious, such as the fact that the fish do not respect boundaries themselves, or that the division might lead to interminable squabbling, particularly over the rights that should go with islands such as Bermuda and the Bahamas. I don't think, however, that it would be in the United States interest and I can list a few reasons why. One is that it would restrict the freedom of U.S. fishing. Another is that if there is a tendency, as Wib Chapman has pointed out, for single purpose rights ultimately becoming full sovereignty this would be militarily a disadvantage to the United States in that it would restrict the Navy's mobility. That is

speculation to be sure. Then there is a third aspect of it and that is how you define national or United States interests. Do we define U.S. interests solely on the basis of the monetary income to the United States or do we take into consideration the non-monetary aspects as well? Is there a U.S. interest in achieving some form of public order through some other means than moving out and claiming a vast area of the Pacific Ocean as ours.

Now you mentioned something about acceptability. I was quite brief in my remarks because I felt I was presenting simply the principle that had to be considered in the question of distribution. With respect to the practical, pragmatic aspects of acceptability, I am not at all sanguine that we can achieve these principles in their entirety but I think we ought to set them forth and then try to work towards them as far as we can.

Jackson: I would like very much to live in a fisheries world such as that described by Dr. Christy. However, for a variety of reasons I rather expect that in the next twenty years or so we will live in a world much more like the one described by Dr. Kasahara. It may be even more chaotic and changeable and with many extensions of jurisdiction.

When I reflect on the prospects for a supra-national authority which would allocate or auction the right to fish I remember that neither the United Nations nor any of the UN specialized agencies could exercise sovereignty or infringe on the sovereignty of member states. I think it highly unlikely that all, or even a great majority, of nations would transfer to a supra-national authority the present and future rights of access of their citizens to the sea fisheries.

I don't think the hazards of destruction are as great as they sometimes are thought to be; within our experience most fish stocks recover rather well during periods of light or no fishing. The absolute destruction of a stock for all time is not a particular problem except in a few instances, such as seals and whales.

Christy: Mr. Jackson, I think there is some degree of misinterpretation here. First, because the present world and the continuation of the present world we foresee is chaotic, doesn't mean that I would be willing to accept chaos as a desirable goal. Second, as to the destruction of stocks I agree with your analysis of it, that we are not likely to destroy stocks except possibly for a few species such as the mammals. But I didn't refer to that possibility as being a reason for establishment of an international approach to the resolution of these difficulties. A supra-national authority may be an ultimate end eventually but I think we can approach this on a piece by piece basis perhaps beginning, as Dr. Kasahara suggested, with the Antarctic whales, or where there is the problem of congestion and a great loss of economic rent. Now putting these kinds of resources within some sort of regional international authority, if you will, does not prevent any nation from having a right of access. It indeed maintains the right of access. What it does prevent is the free right of access; the penniless right of access which has been so destructive.

I would like at this time to answer two questions which have been raised. The first question was why should not history be the criterion for the division of the resources of the sea. I suppose indeed it could be but I am not sure that it is to the best interest of the United States (to be frank) or in the best interest of the world community to make this the principle for the distribution of the wealth of the sea. We have, I think, an opportunity to arrive at some alternative system for the division and what I am suggesting is one that I think would be more acceptable and beneficial over the long run.

With respect to the second question of what country would acquire the most licenses, this would depend primarily on the country's efficiency in the operation of fishing vessels--the cost of labor and capital and the value of the commodity. The purchase of the licenses would be made by countries which have the technological efficiency to operate on the high seas and in this respect it might well be the United States that could take a strong hand and a large share of it.

Kamenaga: My view is that if we decide the allocation of resources on some economic basis what will the present developing countries say? I think they will raise some political questions on some licensing without auction. I think the developing countries could not pay enough money to get the licenses by auction. From an economic analysis standpoint it may be surplus or profits which are gained by the effective conduct of fisheries, but any country which wants to acquire food from the sea wants to pay on the basis of politics not of economics. In an auction system no economic principle will be possible.

Christy: What would be the alternative though if we did not have this? That is, what access would the developing countries have under the present chaotic conditions? Still a certain amount of capital is required to participate in the fisheries. On the other hand, the location of the stock is an important factor with respect to the efficiency with which one can operate and it may be in certain instances that the less-developed countries because of their location may have a greater efficiency in operating and could bid more for a right to the resources nearby than some of the more developed nations. They would be purchasing through this bid the exclusive right to operate that particular fishery and would avoid, therefore, congestion. As a matter of interest, since Japan is a nation that does practice a license-limiting scheme, I would like to get from Mr. Kamenaga some indication of the value of these licenses. How much do some of the companies pay?

Kamenaga: I seem to be against limited entry yet Japan has had a limited entry system for many years. It is quite useful for domestic guidance and administration, but I wonder if it is useful as an international technique. Now you may ask why it is appropriate for domestic and not for international fisheries. I think that at the present stage of world politics each country has a responsibility to support its own interests. A sound economy is the responsibility of each nation.

In answer to your question, in our system the license is free, but it is transferable under some conditions. Those people who wish to acquire a license by transfer usually pay an amount which varies widely according to the income or profit of the respective fisheries. I think in the case of the tuna license it costs about 200,000 yen per one tonnage.

Christy: It is 200,000 yen per one ton of vessel? How much is 200,000 yen in dollars?

Kamenaga: About $500 or $600.

Christy: It is $600 per ton of vessel and a 1,000 ton vessel is $600,000?

Kamenaga: There are no 1,000 ton boats in Japan. They are usually 100 tons or 200 tons. The owner would pay $5,000 in the case of a 100 ton boat.

Christy: For 100 tons it would be $50,000 for the privilege of operating.

Kamenaga: That is economically so. But it is a matter of business between industries.

Christy: But it is a reflection of the value of the property, that is, the tuna property on the high seas.

Question: Is that for one year?

Kamenaga: The licensing is usually for five years but it can be renewed for another five years if there have been no violations.

Christy: The question has been asked as to the kind of international authority that would be developed: What requirements this authority would have and what jurisdiction it would have and how it would be limited or controlled or how it might be taken advantage of to prevent its limitation. If, for example, you had an international authority for the whales of the Antarctic it might indeed be made up of the International Whaling Commission, as it now exists. And the whaling commission with the increased authority that would be required of it would be the one that manages the resources of the Antarctic whale and the krill and would see to it that the regulations, in the interests of the whaling commission and the interests in the development of it, would indeed be enforced. In this particular case I don't think that enforcement would be particularly difficult. It may be more so in other areas. We actually have the problem of enforcement already, as we heard from Dr. Aglen, and I think that enforcement becomes generally easier when the restriction is on the amount of effort than it is when it is with respect to the kind of net that is used or the closing of areas or many of the other things that Dr. Aglen pointed out. If you simply have to count the number of vessels you can do this more easily than by having to inspect what they are catching and what size.

Question: Is is not possible that a situation could develop in which a state, for reasons far in the future, could by abiding by the rules and regulations set down by an international organization acquire some form of control over a specific geographic region, and it then might refuse entry to that area of ships from another state which might result in a confrontation of the type which you are trying to avoid?

Christy: But these are rights solely for fishing.

Question: That is right; and they are solely exercising these rights for fishing.

Kasahara: I have no objection to this kind of arrangement being made for some particular type of operation if it could be done, but even there it would be very difficult. If you propose this kind of arrangement as a worldwide principle to control high seas fisheries my feeling is that it is just absolutely impossible. I can cite many reasons. To begin with, in order to make this a world order all nations should vest their fishing rights in one organization and I don't think this can be done. Even if this was done, this organization would have tremendous administrative problems. You would have to hire tens of thousands of people and the costs would be tremendous and the rents you collect from fisheries would be dissipated in overheads. You would have to go to the member countries and ask for additional donations for conducting administrative work. I would rather see the money dissipated among fishermen. Thirdly, you must realize how much effort is being made by individual governments to enforce the laws and regulations they now have. It would seem infeasible to have this all done by one international organization which, by the way, must be controlled by some kind of a governing council, which would be a political body and would bring in all sorts of political complications.

Fourthly, from the point of view of developing nations this would be a very unsatisfactory arrangement. One of the main reasons why less developed countries are doing fairly well in the field of fishing is, as pointed out by Mr. Kamenaga, that they can capture the difference in cost as extra profit and thus expand their fisheries rapidly. In proposing this kind of property rights system you would be denying this advantage to all of these developing nations. If fishery development had not taken place as yet so that you could start from the beginning it might be all right but all these nations now realize that they can develop their fisheries at a fairly rapid rate. Under these circumstances, the proposed system would be completely unacceptable.

And, finally, there is no way of preventing monopoly of fishing rights, directly or indirectly, by some nation or group of nations. So then it would become eventually the question of politics and then somehow countries would have to get together and decide things on a political basis. Now after all this trouble what would you actually end up with? It would not be so different from what we already have, because there are various arrangements developed in particular situations--in the North Atlantic, in the Pacific, in the North Sea, etc. As a world order this kind of thing is to me not worth considering.

Christy: I think that the difficulties you mention are indeed great. But the difficulties of continuing under the current conditions are also great. I do not think we can avoid facing up to these difficulties.

Kasahara: Yes, we are proposing to face up to these difficulties but in a different way.

Christy: What about the system on the North Atlantic?

Kasahara: We are dealing there with problems under the existing conditions of the region.

Christy: And if the difficulties lead to the destruction of the whales of the Antarctic this seems to be accepted. If the conditions lead to a continued decline in the catch per unit of effort in the North Atlantic, this is to be accepted?

Kasahara: The whale stock has declined not because of the system. Actually they established rights among the whaling nations which were transferrable. There is nothing wrong with this; what is wrong is that the countries did not agree to keep down the total hunting efforts and actually the recommendations made by the commission have been always too liberal.

Christy: So the rights were actually not very meaningful?

Kasahara: This was not the fault of the system itself.

Christy: Well, it was essential to the system that the rights be meaningful, and again in that case they were not.

Kasahara: Back in 1946 we did not have biological knowledge such as we have now.

Christy: Let me ask how you would respond then to the desires of the fishermen of the North Atlantic to restrict the entry into the North Atlantic fisheries. What kind of system should be developed? What kind of response should be given to those fishermen?

Kasahara: I think this should depend on the wishes of the countries fishing there.

Aglen: I was going to say, Mr. Chairman, I wonder if we shouldn't have the existing organizations have a further try. The first conservation measures to be introduced were the simple ones of mesh regulation, and even they took some time to introduce because of the difficulties of persuading fishermen to attempt the requirements. We got them launched, we actually increased them in several areas, and now we are coming up against the next problem, that mesh regulation by itself doesn't do the trick because of the increasing effort. It is pretty plain now to everybody that in order to restore the stocks in some areas you need to find an arrangement for reducing effort. It is abundantly clear that when you do that you get biological gain; then you go on to divide up the effort or the catch whichever way you do it into national quotas among different countries to get an economic gain.

Now we have only just come to this in the present regulatory projects. There are all sorts of problems involved, and whether you do this by regulating effort, or by trying to have the total catch divided into national quotas, is still a matter of argument. I am quite sure there will be very great difficulties in dividing up a total catch between the various countries, but I am not sure that this will be any more difficult than trying to reach agreement on some new system of vesting fishing rights in a supra-national body. I think this business of dividing up a catch among the countries concerned through a commission will be very difficult, but I don't think it is impossible. It was done with whales (admittedly with only five countries) and it took four years to do it.

What I am saying is we mustn't give up hope quite as easily as that. I think although there are difficulties which are so obvious to some of us at this time, we ought to make it possible for the groups that are involved in these regulatory bodies to have a stab at doing it possibly on a trial basis for a period. I mean it would have to be on a trial basis in any case because I don't think at the present stage we can go for an ultimately desirable stricter control in some areas than in other areas. But I like to think the advantages to be derived from this, both biological and economic, will be such that the nations concerned will be able to rise above their own immediate and national interests and come to some kind of agreement between them. If they can't do that I see very great difficulties ahead, and even greater difficulty in reaching agreement on any other basis until we get some kind of supra-national body that can come with a big stick and tell nations what they are going to do. Admittedly there is this problem of new nations joining in; you have a limited catch divided up among the bodies belonging to a regulatory body, and what happens when a new nation wants to come in? My impression is that in the North Atlantic there has been no holding back by newcomers. They have stumbled over themselves to come into the regulatory body. The other areas where they haven't got regulations to the same degree, particularly where there are developing nations concerned, I would have thought that it indeed might be easier sometimes to settle these questions. If you take the concept of preferential rights where coastal states may have some kind of preferential treatment, I would have thought that these problems could be solved, too.

Christy: I agree with Dr. Aglen wholeheartedly on this. I think the question is one of what society would want to accept and I think this would dictate whether it should be a national quota amongst those now participating or whether some sort of more open regime. Perhaps we could try it initially on the national quota basis. But I think we have to figure out over the long run what society wants, defining society in terms of those who are going to have an influence on the decision.

Aglen: I just want to add one thing. I think that what we have been talking about so far is regulation on conservation grounds; I think that that doesn't meet all the situations that have been mentioned here today, such as, the questions of the stocks off the United States coast, but I rather fancy that that is not a purely conservation problem. That may need to be tackled on some other basis.

Christy: In terms of my own view and approaches, the major objective of an international regime is that of an economic one, that of acquiring some sort of property right in the ocean which can thereby be allocated efficiently and permit efficient development of the ocean's resources. This to me is the predominant objective; the one that we should really be seeking. The fact that it does produce a revenue through this system is a quite secondary point, as I mentioned. We must try and separate the question of the efficient utilization of the resources from the second question of the distribution.

Question: In all these discussions people have been referring to and reading conventions relating to the coastal states and their presumed rights, without mentioning or apparently considering either the responsibility that goes with those or with the right or privileges of non-coastal states. I think if these are considered they alter the discussion. First of all, I think the states which are so eager to assert their rights over increasingly larger portions of the ocean sea should be prepared to assume responsibilities for such things as the prevention of pollution, the elimination of hazards to navigation, professional piracy, and a variety of other things, none of which have been mentioned. It reminds me very much of the discussion of state's rights in the United States which seldom brings up the responsibilities of the states. Secondly, the landlocked countries certainly have an interest in the products or the results of the exploration and development of the ocean's resources. If we assume, and I do, that the global scene is in fact the property of everyone, everyone includes countries which have no coastline and even those which have nominal coastlines, such as Jordan or the Congo which have only a few miles of coastline. We here all represent countries which have extensive coastlines; moreover all of our countries have very sophisticated technologies and large quantities of capital available for investment, and we are speaking from a very slanted point of view. We must remember that the total population of the Western peoples constitutes only a very small percentage of the world's population; and it is very easy for us to sit around here and discuss what kinds of regimes would be appropriate and beneficial for us but we do have to consider that there are other people whose voices may be very small and certainly not in proportion to their numbers and importance in the world.

Harrington: There has been a lot of discussion in the last hour or two regarding the workability of giving international bodies responsibility to supervise oceanic resources. Such supervision involves two things, one is to collect the knowledge required to determine what regulations to enact and the second is to enforce these regulations. Knowing the problem we have with our present international bodies supervising high seas fisheries these two requirements still appear to be the most important problems ahead. From Mr. Christy's later remarks it seems to me that if the proper change is made in our present international fisheries regulatory agencies, giving them the authority they need to be effective, they would to a considerable extent meet the proposal that he has made. Then as we stand in the world at present our most practical approach would be to seek to get these changes in our present international bodies dealing with fisheries. If this could be carried out rapidly enough it would meet the problem. If it is not carried out rapidly enough I think there will be a continuation of the extension of unilateral jurisdiction which would also resolve the problem to some extent. Now if it were decided to ignore the views and theories of practically all the international fisheries people I know of and turn over some ocean resources to a new body I would suggest that probably Antarctic whaling is the best one to try for two reasons, one, the new body couldn't do a much worse job than the one done already and, second, try out this new method of handling the problem on a limited scale before extending it to other resources. To restore the blue whale will take about fifty years and this ought to give time to work over and improve the present method.

REPORT ON JURISDICTIONAL, ADMINISTRATIVE, AND TECHNICAL PROBLEMS RELATED TO ESTABLISHMENT OF CALIFORNIA COASTAL AND OFFSHORE BOUNDARIES

"CHAPTER II"

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State Lands Division

A report entitled "Jurisdictional, Administrative, and Technical Problems Related to the Establishment of California Coastal and Offshore Boundaries," was presented at the June, 1966, Conference of the Law of the Sea Institute. A continuing report on these matters is of significance to the conference because the boundary of the territorial seas is the most landward boundary of the outer continental shelf. This line divides jurisdictions over all offshore operations, which must be conducted under widely different statutory authorities.

The current report ("Chapter II") can be summarized by stating that none of the seven general problem areas reported in 1966 has been resolved with any degree of finality, even as to any one of their numerous components; and, more aggravating, additional components which require resolution have been identified.

On the positive side there is now a pragmatic interim solution to the problem of jurisdictional classification of the California intra-state air carrier with air routes more than three miles offshore the mainland. Immediately preceding the trial date on the question of federal jurisdiction because the air routes leave and re-enter the state and the United States, the Civil Aeronautics Board issued a waiver declining to enforce jurisdiction on the airline as an interstate carrier.

In a review by the U.S. Coast & Geodetic Survey of the existing technological inability to demarcate offshore boundaries with precision, the Survey reported in March, 1967,[1] as follows, in part:

> "The more one studies the subject of the boundaries in the sea, the more one is impressed with the number of technical questions that arise and the extent of judgment required. This is not a criticism of the Submerged Lands Act and the Convention. The most they can do is to provide the principles for the delimitation of sea boundaries; they cannot provide the answer to every technical problem which will arise in laying out sea boundaries in the presence of an almost infinite variety of physical features. This will require agreement and cooperation between the State and Federal Government and probably some litigation."

An existent example requiring study, cooperation, and agreement is depicted in Figure 1. In the immediate vicinity of Point Conception and Government Point, Santa Barbara County, California, there are several apparent "rocks awash"--with little agreement between available maps and charts as to their exact positions or correct designations. These "rocks awash" constitute "low-tide elevations" as defined in Article 11 of the Convention[2] and constitute points on the coastal baseline to be "marked on large-scale charts officially recognized by the coastal State" as specified in Article 2 of the Convention. The Figure 1 map shows that there are at least three different series of existent official depictions of the locations of "rocks awash" in the area under discussion.

And now--the $64 million question: What structures or elements are contained within the outermost permanent harbor works that form an integral part of the harbor system within the meaning of Article 8 of the Convention? A specific problem has arisen at Carpinteria (again in Santa Barbara County, California) by reason of a pier necessary and utilized continuously for loading and unloading personnel, machinery, equipment, and supplies for operation of petroleum development platforms almost three miles offshore. The pier and these platforms are located on oil and gas leases issued by the state of California (Figure 2). The question as to whether the pier qualifies as a "harbor works," and therefore as a point on the coastal baseline, came into issue with the decision of the federal government to lease the outer continental shelf area adjoining the state submerged lands. Because the dividing line between federal and state jurisdiction was, and is, unresolved, the federal lease offer[3] provided:

> "As stated on the official leasing map, the 3-mile limit shown thereon is approximate only and does not necessarily delineate such a line in its true horizontal position. In the event of a conflict between the official leasing map and the written description, the written description shall prevail."

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[1] Establishing Tidal Datum Lines for Sea Boundaries, Paper 67-212, p. 17.

[2] Convention on the Territorial Sea and the Contiguous Zone.

[3] Federal Register, Vol. 31, No. 220, 11/11/66, p. 14535.

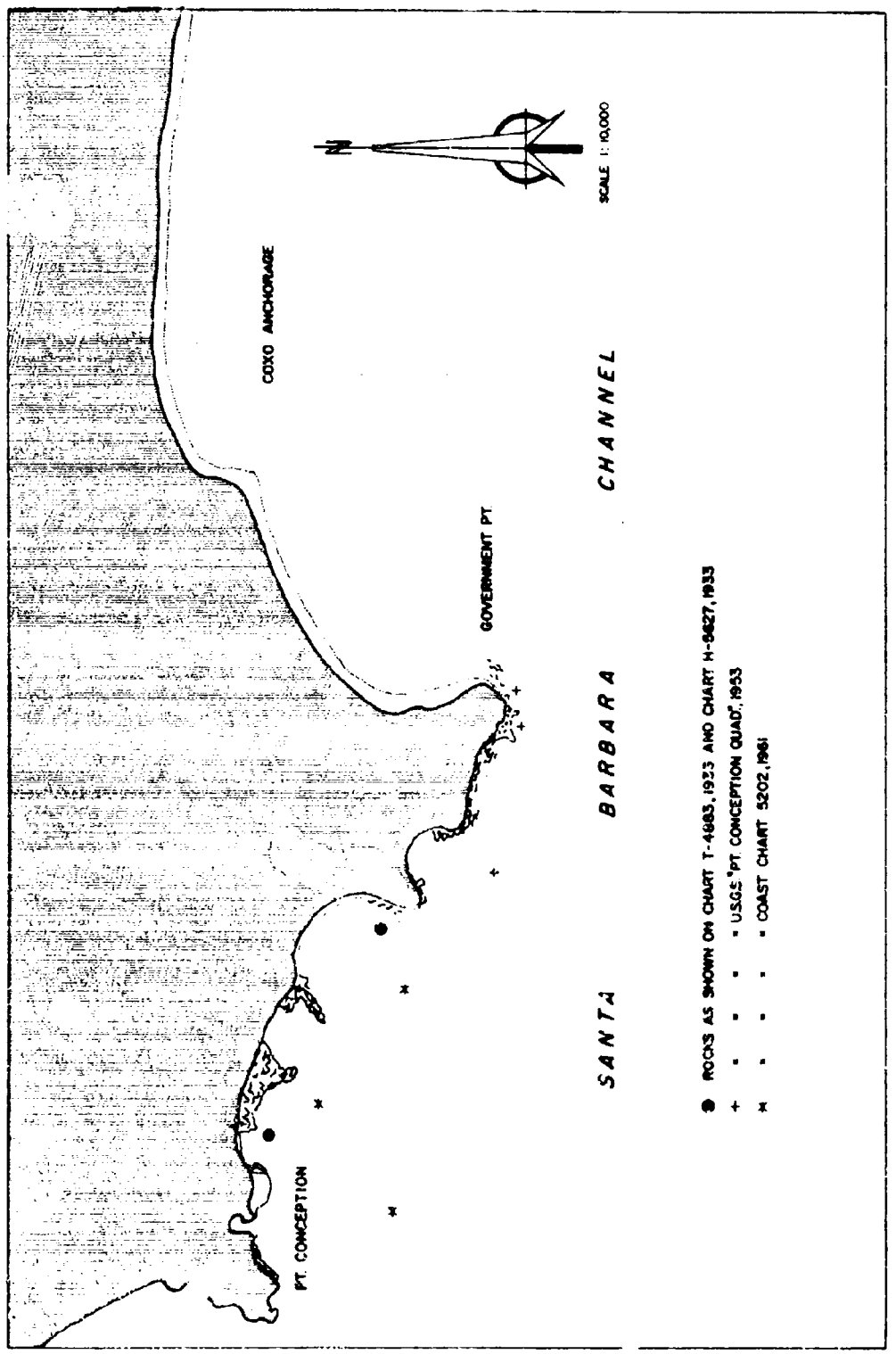
COXO ANCHORAGE
GOVERNMENT PT
PT. CONCEPTION
SANTA BARBARA CHANNEL
SCALE 1: 40,000
ROCKS AS SHOWN ON CHART T-4883, 1933 AND CHART H-8627, 1933
USGS "PT CONCEPTION QUAD", 1953
COAST CHART 5202, 1961

FIGURE 1

The written description specified:

> "Tract No. Cal. 293: all those portions of blocks 52N 63W and the N1/2 of block 51N 63W lying seaward of a line 3 geographical miles distant from the coastline of California (as said coastline is defined in the Submerged Lands Act of 1953) containing 1995.48 acres more or less." (Underscoring added.)

The area of 1,995 acres includes 31 acres (cross-hatched on Figure 2). This cross-hatched area is California submerged lands if the coastline includes the pier as a point on the baseline. The value of this small parcel may be inferred from the cash bonus paid to the United States by the highest bidder for the award of a lease on 1,995 acres--$21,189,000, or $10,618.50 per acre--a United States record.

A second question on baseline establishment relative to "harbor works" has arisen in Texas--but with all of the usual potential for setting legal precedents applicable to all coastal states. In this instance Texas proposed to offer an offshore oil and gas lease based on locating the state seaward boundary by measurement from a base point at the seaward end of jetties at the entrance to Galveston Harbor. The federal government sought a "Motion for Injunctive Relief and Supplemental Decree as to the State of Texas" on the principal contentions:

1. The 1965 decision in U.S. v. California, defining the coastline in terms of the Geneva Convention, is inapplicable to Texas because that state's offshore boundaries are defined historically and not in accordance with the rules of international law.

2. The structures in question are removed from an actual harbor and, therefore, do not constitute harbor works within the meaning of the Convention (assuming that it is applicable).

3. The U.S. State Department has taken the position that it will not recognize piers and jetties extending more than one mile into the ocean.

No restraining order was granted because of agreement by Texas to withhold the lease offer pending judicial determination of the issues. These issues will be heard by the U.S. Supreme Court assumedly during the Fall Term this year.

Another problem area was reported last year as a question: "If the coastline includes a breakwater as part of the 'outermost permanent harbor works,' what is the nature of the transition from the seaward end of the breakwater coastline to the mainland coastline?" This question is under active consideration because it is no longer academic. The design of development programs for a segment of the state's submerged lands is now dependent upon the precise establishment of the limits of the Port of San Pedro. Unfortunately (or fortunately), the Supplemental Decree in U.S. v. California[4] in January, 1966, stated directly:

> "...the limits of the port, east of the eastern end of the breakwater, are not determined by this decree."

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[4] 382 U.S. 448.

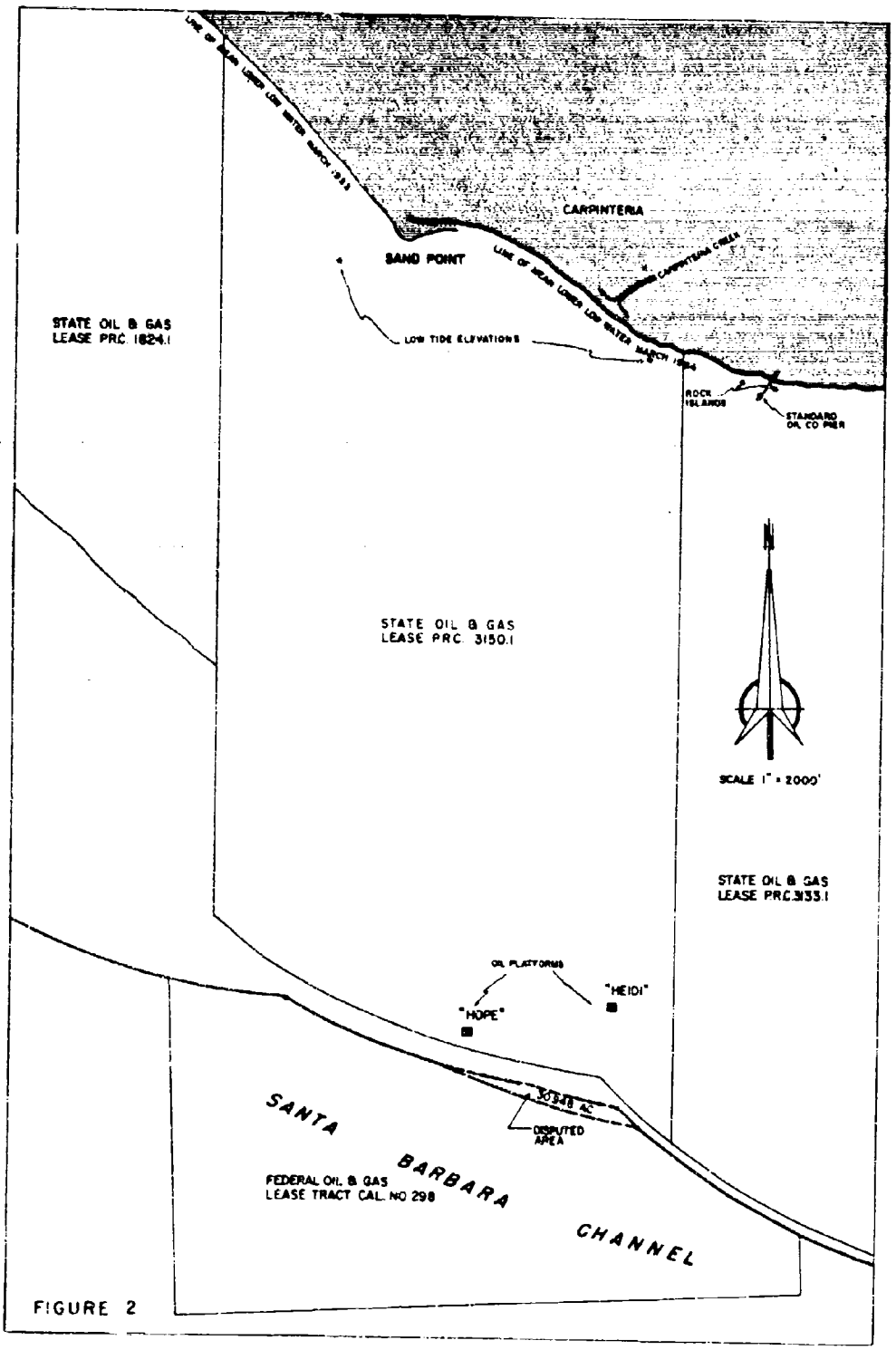
CARPINTERIA
SAND POINT
LOW TIDE ELEVATIONS
ROCK ISLANDS
STANDARD OIL CO PIER
STATE OIL & GAS LEASE PRC 1824.1
STATE OIL & GAS LEASE PRC 3150.1
STATE OIL & GAS LEASE PRC 3133.1
SCALE 1" = 2000'
OIL PLATFORMS
"HOPE"
"HEIDI"
DISPUTED AREA
SANTA BARBARA CHANNEL
FEDERAL OIL & GAS LEASE TRACT CAL. NO 298

FIGURE 2

A DEVELOPING POLICY FOR INTERNATIONAL FISHERIES

Hon. Donald L. McKernan
Special Assistant
for
Fisheries and Wildlife
to the Secretary

A policy dealing with international fisheries development and conflict cannot be viewed in isolation from the broad foreign policy interests of the United States. Yet, while decisions on international fishery questions have been made contrary to the interests of U.S. fisheries from time to time, it has more often been true that the policy of the United States in seeking resolutions to fishery disputes between our fishermen and the fishermen of other countries has been designed to protect to the maximum, by peaceful means of course, the interests of United States fishermen.

It seems useful at this time of great national interest in the expanding use of the resources of the ocean to review the way in which this government has approached discussions in the international fishery field in recent years, first with a view to examining the effect of this approach on United States fisheries and second to ascertain whether or not there has been a consistent development of policy in dealing with these problems.

This examination is not intended as a declaration of existing U.S. fishery policy, nor is it likely that the thoughts expressed here by the author will stand for long in the light of the rapidly changing condition of national and international fishery affairs.

Before looking at the result of recent international fisheries negotiations, it would seem appropriate to state our national goals. That is, to ascertain whether or not we have been consistent in dealing with our international fishery problems, we should state clearly what objective we have in mind. I would think that few would argue that one way to express our national goal with respect to living resources of the sea is that we want our people now and in the future to have the maximum opportunity to use the resources of the seas. A secondary objective might well be stated as wanting to ensure the maximum use of the living resources of the sea for the lasting benefit of mankind.

It does seem entirely reasonable that the United States government look at the use of world fishery resources in terms of the benefits to the United States from both a long and short term view. Furthermore, it seems logical to expect that in all likelihood other nations are looking at the use of the sea's resources in much the same way; that is, they would like to use the resources of the ocean to the maximum for the benefit of their people; and we cannot fault that view.

It is in seeking to achieve these goals by large numbers of nations on a world ocean that still remains for the most part open to all, that international conflicts arise between fishermen of nations and between their governments.

These conflicts can quite often but not always be expressed in some general form. The most common kind of conflict arises from competition on the fishing grounds between competing fishermen of one or more nations for the available harvest from a common stock of fish with the consequent threat of over-fishing and possible depletion of the fishery resource.

Other conflicts arise from the physical interference on the fishing grounds between vessels and between competing forms of fishing gear with the consequent loss of gear or equipment. Often the efficiency of one or both parties is adversely affected by the physical presence of the other. Still another type of conflict occurs when vessels of one country begin catching fish from a stock that has long been harvested by fishermen of another country. In this case the traditional fishery is adversely affected economically, causing complaints from the fishermen who have traditionally fished the stock. In the last and perhaps the most common kind of conflict, the mere presence of foreign fishing vessels off the coast of a coastal state raises the specter in the minds of local fishermen of the loss of their traditional fisheries to foreign fishermen. While the tangible evidence of actual loss is often absent, nevertheless this type of situation has caused serious difficulties, as witnessed in the long-continuing dispute between the United States and the CEP countries--Chile, Ecuador and Peru--over the jurisdiction of waters off the coasts of these countries. In this case, although the motivations are complex and do not entirely rest on the fishery issue, these countries for the most part catch little yellowfin tuna, the species most sought by United States vessels, yet the presence of foreign vessels off their coasts causes severe public criticism.

Let us examine more specifically the kinds of international fisheries disputes that the United States has become involved in and see how they fit into a general pattern, if in fact they do.

The fisheries of the United States are and have been mostly coastal fisheries. The yield from off our coasts and in estuarine waters at the present time amounts to between 80 and 90 percent of the total landed value of the United States catch. Yet two of our most valuable fisheries, shrimp and tuna, are to a very significant degree dependent upon resources found on the high seas off the coasts of neighboring countries. Thus, our ocean fishery conflicts involve us on one hand as coastal fishermen, defending our traditional fisheries off our own coast, and on the other hand a high seas fishermen defending our right to fish freely on the high seas.

It might appear that the dichotomy of position of U.S. fisheries is impossible to reconcile. At the same time, the criticism has been heard that the United States solutions to complex international fishery disputes are solely based on pragmatism and that the solutions have been temporary in nature without any consistent basis in principle.

It is obvious from the record that the United States, in trying to follow a policy leading to the goals mentioned earlier in this paper, has surely made mistakes; yet, there is a consistency to our policy in international fisheries affairs that leads back many years. (It is not a coincidence that the two men who have to a considerable degree

shaped this policy within our government have been active participants of both of these Law of the Sea conferences. Of course I speak of Dr. W. M. Chapman and William C. Herrington.)

As many participants in this conference have mentioned, the United States is a member of several conservation treaties on fisheries. If you choose to call the Fur Seal Treaty and the International Whaling Conventions fisheries treaties, then we are members of eight active international fishery conservation conventions. The purpose of these has been to resolve conservation issues that have arisen when two or more nations, including our own, have been heavily fishing or hunting common stocks of fish or marine mammals, and as a result there has been danger of over-fishing and depletion of the stocks. In some cases such as the fur seals, halibut and Fraser River sockeye, severe depletion had occurred before the Commissions were formed. In other cases, such as the Northwest Atlantic Fisheries Convention, Inter-American Tropical Tuna Commission, and the International North Pacific Fisheries Commission, there was danger of over-fishing which led the United States in consort with some other fishing nations to seek a solution through the formation of a conservation convention.

At this point it is well to recognize that some economists have been critical of the purely conservation objectives of these fishery conventions. One must agree that it would be desirable to maximize the economic output from these fisheries; however, the bilateral and multilateral fishery conservation conventions collectively have been quite successful in maintaining viable U.S. fisheries and I for one would be reluctant to set them aside in favor of another system of international control that at the present has not been accepted even for strictly domestic fisheries of the United States. That is not to say that the present systems are perfect or even satisfactory for the future, but it is to say that they have in a number of respects resolved the problems for which they were designed.

In several instances, through joint research efforts--including of course independent research by some of the commissions--the work of these commissions has resulted in a larger total average yield and in addition, the preservation of the resources has been assured. Several of these commissions have resolved, for the short and medium range span of time at least, difficult economic and political problems between countries.

For example, the Pacific halibut catch had declined from about 60 million pounds in the early part of the century to only 44 million pounds before regulation began thirty-seven years ago. Scientific management of this fishery by the International Pacific Halibut Commission has rebuilt the stocks to the extent that they have produced on the average about 68 million pounds annually during the past six years. One could also cite the Inter-American Tropical Tuna or the International Pacific Salmon Fisheries Commissions as examples of highly successful conservation commissions that are accomplishing their objectives year after year.

Some commissions have accomplished much less; the Whaling Commission was faced with a wholly unexpected problem quite outside its terms of reference. In this case it was not enough to establish that depletion had occurred; it was necessary then to allocate among several nations, with very large monetary investments in whaling, the very small allowable catch. The Commission had no great trouble deciding that something needed to be done to conserve the Antarctic whaling stock; they also were able to put quite precise quantitative limits on the allowable catch. Yet the allocation of this catch among those countries that had traditionally fished the resource for a long time and other countries that had only recently entered the fishery was a problem of a different order of magnitude. It has only been partially solved to date.

By confining ourselves primarily to conservation problems, by omitting the more difficult economic problems, we have been relatively successful over the past twenty years since the war in minimizing the effects of rapidly expanding fleets of fishing vessels of foreign origin fishing in areas and on species that had traditionally been fished exclusively by United States or United States and Canadian fishermen. The success or failure as the case may be of U.S. fisheries during the period have not been greatly influenced by foreign competition for the resources. However, in the past five years, the increase in these foreign fleets off our coast has brought into sharp focus the potential danger of serious conflicts between the distant water and coastal fishermen.

These new problems posed by the rapid increase in foreign vessels fishing off our coasts are in their bare essentials economic in nature and they involve who gets the fish and in some cases who gets the fishing grounds. The conservation conventions now in effect were not designed to resolve these new questions, and it is now quite imperative that we find new methods of resolving these new kinds of disputes.

But participation in conservation conventions has not been the only course of action taken by the United States during the past twenty years. As these new problems appeared on the horizon those in this country who were thinking about the deficiencies in existing regimes of the sea began to cast about for alternative solutions. The 1958 and 1960 Law of the Sea Conferences were to some extent the result of such attempts. In addition the United States has helped to strengthen, along with other North Atlantic nations such as the United Kingdom and Canada, the fisheries group within FAO. Many of the people in fisheries--both within government and without--felt that increased knowledge of the ocean, including increased international cooperation in ocean research, would not only help increase the probability of achieving our national goals but would provide as well a background of scientific information for resolution of controversies in international fishery affairs. As a result, domestically the National Academy of Science and the Interagency Committees on Oceanography both began to promote ocean research and internationally the Intergovernmental Oceanographic Commission was formed after much struggle within UNESCO.

These efforts have not been uniformly successful, but they have served their purpose well and have improved our capability of solving, on the bases of improved knowledge of fisheries and the ocean, serious conflicts that have arisen in recent years. In other words, they have increased the number of acceptable alternatives to any given problem.

Thus, in summing up our policy of the past two decades, we have tried through bilateral and multilateral fishery conventions to set up arrangements which would ensure the conservation of resources of most concern to us, and at the same time we have sought to build through the United Nation's Law of the Sea Conferences and through international

bodies such as FAO, UNESCO, and most recently again the United Nations, devices that might more effectively deal with the complex problems of the future.

Most of these efforts have been helpful, but much more needs to be done if we are to keep pace with the rapidly increasing use of ocean resources by all of mankind.

Successful or unsuccessful as you may think the efforts have been thus far, there are some new dimensions that cannot--in my view--be resolved by present international rules or practices. I have mentioned before in this discussion that I consider these problems essentially economic in nature although they manifest themselves in many ways. They arise in some instances because of the difference in the technological level of the fishing equipment of high seas fishing nations; in other cases the sheer numbers of new fishing units appearing on restricted fishing grounds near the coastal state cause excessive competition between the fisherman with a concomitant reduction in the catch and income of special seriousness to the coastal fisherman who cannot move readily to new fishing grounds.

These problems have arisen on both coasts of the United States and have caused great distress among United States coastal fishermen. They brought about an agonizing reappraisal of this country's long-standing three-mile fishery limit and resulted in an extension of that limit to twelve miles only last year. It has been alleged that our fishermen fishing off the coasts of several other countries have caused similar problems.

Thus, we must concern ourselves in the future with this problem. Our coastal fishermen seek some protection from what they consider unfair and unwarranted competition for a limited catch and fishing space; a twelve-mile fishery limit is not adequate to ensure either to them.

Our long-range fishermen wish to maintain the greatest possible fishing area everywhere on the ocean and they cannot economically operate with vast areas of the ocean closed to their free movement. On the other hand, the long-range fishermen of the United States have no need to compete so intensively for fish stocks found in the waters of the high seas off the coasts of foreign countries--nor enter fisheries off foreign coasts that are already being heavily fished by coastal fishermen to the degree that would endanger the livelihood of those fishermen.

Nevertheless, it is my view that some additional assurances must be given the coastal fishermen beyond those given in the 1958 Convention on Fishing and Conservation. They must be assured that not only will the fish stocks of particular concern to them be conserved but that they will have a reasonable opportunity both to participate in the harvest of those resources not now used by them and to take their traditional share of those stocks which they have fished in the past.

Some few coastal nations are attempting to protect their interests in the fishery resources off their coasts by unilaterally extending their fishery limits beyond any acceptable limit. Such action in the absence of any legal basis is an unacceptable alternative. Such unwarranted extensions of jurisdiction would serve to set aside vast productive areas of the ocean and in many cases would allow them to lie fallow and unproductive, thus preventing full development of the food resources of the world ocean.

It is becoming popular to advocate turning over to the United Nations or some other supra-national body title to the resources of the sea with the view that this body could license an appropriate number of vessels to harvest at optimum efficiency the food resources of the sea. It is not at all clear how this nation can achieve its goals under such a system. Some other objectives might be accomplished by this move, but I doubt that this nation's fisheries would long prosper under such a system.

The alternative, it seems to me, is to pursue a strong course of action under the four Law of the Sea Conventions that provide among other things for freedom of fishing and for the conservation of the food resources of the ocean. To these current components of our high seas fishing policy I would add some consideration for the special problems of the coastal state--a consideration well within the general intent of the Geneva Conventions. With such considerations, I believe we could develop a viable system capable of providing better protection for the coastal fisherman while allowing a reasonable e[illegible]e of the important principle of freedom of fishing on the high seas, thus protecting the rights of our distant wate[illegible]armen.

It appears to me that such a system will have considerable general appeal to nations of the world.

All high seas fishing nations that I know of have problems similar, more or less, to ours. These nations also are interested in pursuing their current distant water fisheries without constant difficulty or harassement by coastal states. Witness our recent discussions with Japan and the U.S.S.R. Agreement was reached on the basis of mutual give and take--with major compromises on both sides, but important principles embodied in the four 1958 Law of the Sea Conventions were maintained. Where the coastal fisheries of the United States had special problems on the high seas beyond the twelve-mile contiguous fishing zone, consideration was given to these problems by the high seas fisheries. By means of these important negotiations, provisions were made for the high seas fishermen to fish stocks not being utilized by U.S. fishermen even within the contiguous zone of the United States. Thus, we were consistent in providing the opportunity for full use of the ocean's food resources while resolving to a reasonable degree the problems of the coastal fishermen. I believe we should seek further agreements of this kind. Furthermore, such arrangements ought to have broader application world-wide. For example, they ought to be equally effective with those countries off whose coasts our distant water fishermen fish.

It will be remembered by those who attended the 1960 Law of the Sea Conference that the proposal which came within one vote of receiving the two-thirds majority required for adoption contained a very similar idea. In that case a coastal state, subject to certain conditions, could claim preferential fishing rights in areas adjacent to its contiguous fishing zone.

In summary, it would appear that the development of a policy for dealing with international fishery problems has proceeded at a reasonable rate in this country. Actions by this government to resolve international fishery disputes, with some notable exceptions, have led to reasonable solutions of the problems. The conservation policies that have been useful in the past are likely to be less useful in the future as international disputes involving economic issues become more prevalent. It has been suggested that a useful policy for the future would be to give more attention to the special fishery problems of the coastal state while protecting the principle of freedom of fishing on the high seas and insisting on a reasonable exercise of the use of this right by distant water fishermen.

JAPAN'S REENTRY INTO PELAGIC FISHERIES: FROM SURRENDER TO THE NORTH PACIFIC FISHERIES CONVENTION, 1945-1952*

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New York City Community College
of the City University of New York
Brooklyn, New York

The right of access to and exploitation of the resources of the world's oceans is basic in the law of nations. From time to time certain restrictions have been accepted on this freedom. Japan, from surrender in August, 1945, until the coming into force of the peace treaty in April, 1952, was severely limited in the exercise of that right. For nearly seven years Japanese high seas activities were strictly confined to so-called authorized fishing areas, conducted according to regulations issued by the Supreme Commander for the Allied Powers, SCAP.

During the Occupation the views of the United States as the principal occupying power managed to prevail. The councils of its government favored the gradual return of Japan to full sovereign participation in the access to and the utilization of the resources of the sea according to the law of nations. Other occupying powers, especially the Soviet Union, the Philippines, Australia, and New Zealand, had contrary views. If these had prevailed, the Japanese would not have been permitted the same degree of freedom in reentering important fishing areas of the high seas nor to engage in Antarctic whaling.

Prior to World War II the Japanese were engaged in aquatic activities covering the world's oceans from the Arctic and Antarctic to subtropical waters, from the Indian Ocean to Argentina. Immediately following the close of hostilities, occupation authorities restricted fishing to within a twelve-mile coastal boundary. After several months the limits were extended east to the 150th parallel, south to 30° North, excluding the Bonins and Ryukyus, west to a line bisecting the Sea of Japan, the MacArthur Line, and no further north than the three-mile territorial waters around Hokkaido. After June, 1946, the area was enlarged further east and south into Pacific waters to more than twice the previous size. Finally, by 1949, the Japanese were permitted to fish still further east to the international date line, and, in 1950, south to the equator. (An accompanying map illustrates the successively extended areas.) Whaling operations were first permitted in coastal waters in September and, by November, 1945, in the Bonin-Volcano Islands area. During the summer of 1946 the first of a series of six annual whaling expeditions to the Antarctic was authorized.

In order to counter allied governments' objections to expanding aquatic activities, which were based on prewar antagonisms occasioned by what was considered the ruthless exploitation and contempt for the rights and interests of others, it was necessary for SCAP to require adherence to certain basic principles. Each area authorization directed the Japanese to conform strictly to the provisions of all international agreements to which the United States was a party, including those relating to Antarctic whaling. Japanese fishing activities were further to conform to the policies or rules governing specific fisheries announced by the United States or other governments with respect to coastal fisheries. Fishing near United States territory or island responsibilities, or near areas under Allied jurisdiction without prior permission from the country concerned, was not permitted. Such provisions were designed not only because of strategic and political considerations, but also as a means of guiding the Japanese toward a more wholesome respect and observance of national and international conservation practices.

This aspect of fisheries created a serious dilemma for occupation authorities. On the one hand, Japan had to fish in order to be able to contribute to her own economic well-being. On the other hand, the reappearance of Japanese vessels and crews on the high seas, sometimes close to territorial limits, aroused all the prewar antipathies, jealousies and apprehensions. To some the defeat of Japan was an opportunity to eliminate an economic rival and to subdue a former great power. When discussing the future of Japan in the Far East, Commission, May, 1946, the representative for the U.S.S.R., for example, proposed that Japan should be permitted to develop only such economic activity and a standard of living not higher than that of the peoples of the territories in the Eastern and Southeastern Asia formerly occupied by Japan. The Philippine and Australian representatives had suggested, apparently in all seriousness, that fishing be limited to Japan's coastal and inland fish culture. In the view of others, Occupation policy should encourage Japanese authorities to make the utmost effort to maximize production of fishery products, as well as other essentials for a viable economy. Uppermost in the dilemma over fisheries, however, was the worldwide distrust of Japanese fishermen created during the prewar period. One of the fundamental purposes of the Occupation was to overcome and remove the sources of this distrust.

Under the leadership of the United States, the opposition from allied governments was gradually reduced. In response to Allies' request, SCAP maintained as strict control as feasible over pelagic fisheries. The Japanese were encouraged to collect statistics and conduct research on specific fisheries with a view toward establishing acceptable conservation practices. At times, petitions for expanding the fishing area were turned down by SCAP with the explanation that a program of conservation had not as yet been satisfactorily developed. The government fisheries bureau was elevated to the status of an agency of the Ministry of Agriculture and Forestry in 1948, comprised of administrative, production, and research departments.

The goal of Occupation authorities was to return a new and reformed Japan to full sovereign status by the time of the peace treaty. Thereupon, the Japanese would be released from the restrictions on pelagic fisheries which had been imposed following surrender. If all the dire predictions made by some were correct, they nevertheless would revert to their old ways of destructive fishing without regard for conservation practices or international agreements. On the other hand, if SCAP's policies were successful, Japan would enter a new era of international cooperation.

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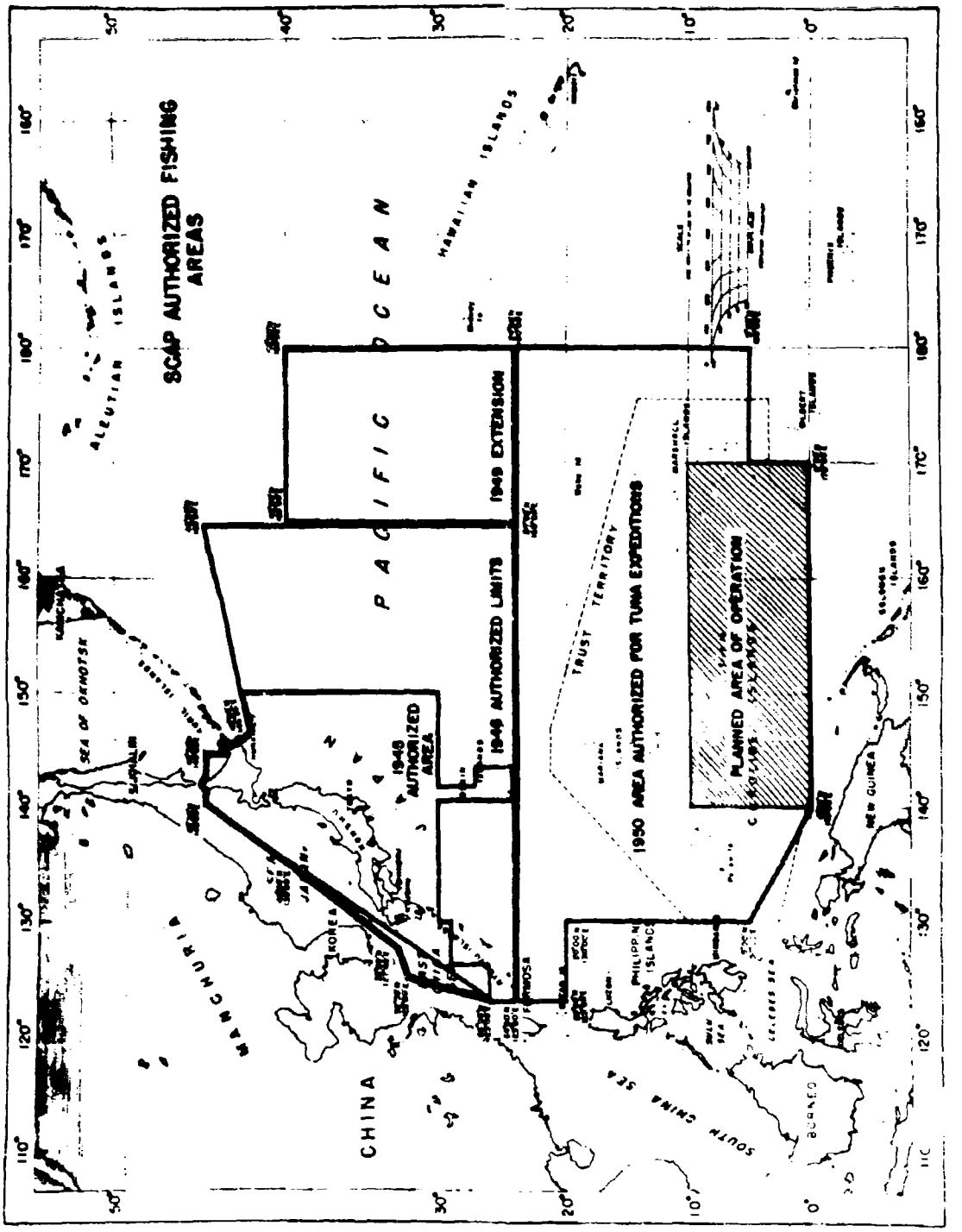
* This paper was not presented at the Conference. The Executive Committee felt that because of the pertinence of the topic it should be printed in the Proceedings.

MAP TO ACCOMPANY PAPER ON "JAPAN'S REENTRY INTO PELAGIC FISHERIES"



The final opportunity offered SCAP prior to the return to full sovereignty was the negotiations over an international agreement for the North Pacific fisheries. If acceptable conservation principles could be included in such a convention, they could serve as a guide applied later by Japan in fishery discussions with other countries. A fishery treaty with the United States was envisaged as the first step, together with support from that country for Japan's accession to the International Convention for the Regulation of Whaling and any other applicable conventions on fisheries.

As a result of exploratory conversations between SCAP and the Japanese Ministry for Foreign Affairs begun in January, 1950, the Japanese stated that they were:

> "...determined that the postwar rehabilitation of Japan's fishery industry shall begin by first making Japanese operations conform strictly to international law and conventions, and international usages, and also by seeing to it that they cooperate honestly in all international measures for the protection and investigation of fishery resources."[1]

The Foreign Affairs Ministry then went on to state three general views which underlay its policy: (1) Freedom of the seas regarding ownership and exploitation of resources beyond territorial waters. (2) The preference for a biological and scientific approach to the problems of sea resources rather than a political one. (3) International agreements to handle areas of controversy.

Early the following year, 1951, Prime Minister Yoshida addressed a letter to Ambassador Dulles while visiting Japan, stating that his government was prepared to enter into negotiations for an agreement on fisheries. The announced purpose was to "establish equitable arrangements for the development and conservation of fisheries which are accessible to the nationals of Japan and such other countries which were concerned."[2] The Prime Minister pledged his government's voluntary action to protect fisheries already conserved by other nations. By the end of the year SCAP authorized the Japanese government to negotiate and conclude a fishing agreement.

In the discussions which followed, the Department of State asked for SCAP's views on a list of principles to be embodied in the proposed fisheries convention with Japan. They were:

> "1. A nation should not be excluded from high seas fisheries in waters contiguous to its territorial waters, or from any fishery in which it has developed or maintained substantial current or recent operations.
>
> 2. A nation may agree to waive the exercise of its fishing rights in any high seas fishery which was characterized by all of the following:
>
> A. Harvested primarily by one or more contracting parties;
>
> B. Under active study to determine conditions for maximum sustained productivity;
>
> C. Scientifically shown unlikely to produce a sustained increased catch under more intensive exploitation; and
>
> D. Operating under regulations limiting or controlling fishing operations for conservation purposes."[3]

By stressing these principles, it was hoped that proper incentive would be provided for developing research and conservation regulations for Japan's own offshore fisheries. SCAP's comments included the suggestion that it should be made clear that Japan's confinement to the authorized fishing areas during the Occupation should not be interpreted as a renunciation of interest in other areas. It should be understood also, that Japan would not be barred from any new fisheries which might be developed. A convention based on these principles would establish conservation as the basis for abstention or exclusion from a fishery.

It was in accord with these guiding principles that the Japanese government and fishing industry negotiated and eventually signed on May 9, 1952, the North Pacific Fisheries Convention with the United States and Canada. This agreement marked the culmination of a program begun by SCAP during the early days of the Occupation designed to achieve for Japan reentry in international fisheries on the basis of equality. The Department of State proclaimed in a press release at the time of the signing that "Japan now becomes a joint partner with the United States and Canada in cooperative measures to preserve and perpetuate the fish stocks of the North Pacific." This final achievement had been one of the conditions for the ending of occupation controls over Japan's high seas fisheries. Just two weeks earlier, the Allied Supreme Commander had rescinded the final directive on fishing areas.

The North Pacific Fisheries Convention has not been without controversy. It has been referred to as marking the beginning of a new concept in international law by incorporating as one of its main features the principle of abstention.[4] In exchange for abstaining from fishing certain species in the North and Eastern Pacific, Japan was assured of American and British support for further development and utilization of fishery resources in other areas. The fisheries of the Northeastern Pacific could well be left to the Americans and Canadians. Undoubtedly, elsewhere there would be opportunities for the development of fishery resources under more advantageous conditions.

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[1] SCAP, Natural Resources Section Files, 410, Item 14.

[2] U.S. Department of State Bulletin, Vol. 24 (1951), p. 351.

[3] SCAP, Natural Resources Section Files, 410, Item 8.

[4] Shigeru Oda, International Control of Sea Resources (Leyden: A. W. Sythoff, 1963), p. 70.

Contributed Paper

SOCIAL INTERFACES IN THE LAW OF THE SEA

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We heave heard a good deal of discussion during these past four days concerning the physical interface in the oceans. This is definitional oceanography language which describes zones where mutually exclusive environments meet. In seeking to frame prospective institutional arrangements in the oceans, it seems that lawyers might usefully take a page from oceanographers, and focus on the various social interfaces created by conflicting and inconsistent--mutually exclusive--claims presented by different users rather than attempting to fit ocean problems into land terms such as "sovereignty," "property," and "jurisdiction." For while these are terms of art which fall familiarly on the ear of any lawyer, they provide only an illusion of certainty; and continued indulgence in illusions may serve to inhibit rather than promote rational utilitarian institutional growth for two primary reasons.

First, these concepts developed as a consequence of a feudal society and the societal interaction with respect to two-dimensional land masses whose physical characteristics were understood and well defined. They imply certain precisely ascertainable shared expectations on the part of those advancing such claims. To import these concepts into the three-dimensional world of the oceans where the societal interaction is best characterized by constantly shifting claims and responses, as technology expands and assertions of right proliferate, will result, perhaps inevitably, in obscuring alternative concepts which might be infinitely more appropriate.

Moreover, terms of art such as these carry in their wake specific and often singularly inapposite legal consequences which have no relevancy to the social ordering process in the ocean.

Thus, while Professor Goldie properly reminded us that to a lawyer the term "common property" was something of a non sequitur, it seems perfectly possible that such terms may have utility since they describe the social interface with some degree of fidelity. This, one might contend, represents a more meaningful beginning than artfully attempting to distort formalized language to embrace social requirements in an entirely foreign setting.

Lawyers can contribute to the social ordering task in this environment best, perhaps, if they are willing to break with the past, abandon outworn language, and begin constructing new concepts which are consistent with ocean realities. An analogy is suggested by the work of Grotius. Faced with a theocratic tradition and the entirely logical extension of sovereignty in the guise of mare clausum, Grotius recognized the larger, quite inconsistent, claims presented by an expanding technology and the rise of middle-class merchant adventurers, and he invented an institutional doctrine which met this societal need. Had he been inhibited by a narrow reading (or, as DePauw suggests, any reading) or precedent; or if his inquiry had been restricted out of awe for the papal theocracy, the development of the formal doctrine of freedom of the seas might have taken an entirely different course. But Grotius had pointed the way, and slowly but surely, the world followed.

The societal requirement in the ocean is infinitely more complex than Grotius could possibly have envisioned; and we lawyers must find ways to preserve those concepts which have continued utility, while at the same time suggesting new pathways to meet the increasing demands of technology and the human requirement. We cannot make this contribution by turning the clock back three and one-half centuries by drawing upon wooden concepts such as "sovereignty," "property," or "jurisdiction." We can only move forward by inventing new concepts designed to meet the needs of the twentieth century.

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* This paper was not presented at the Conference but was approved by the Executive Committee for inclusion in the Proceedings.

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A HYPOTHETICAL DIVISION OF THE SEA FLO

(after Pope Alexander VI)

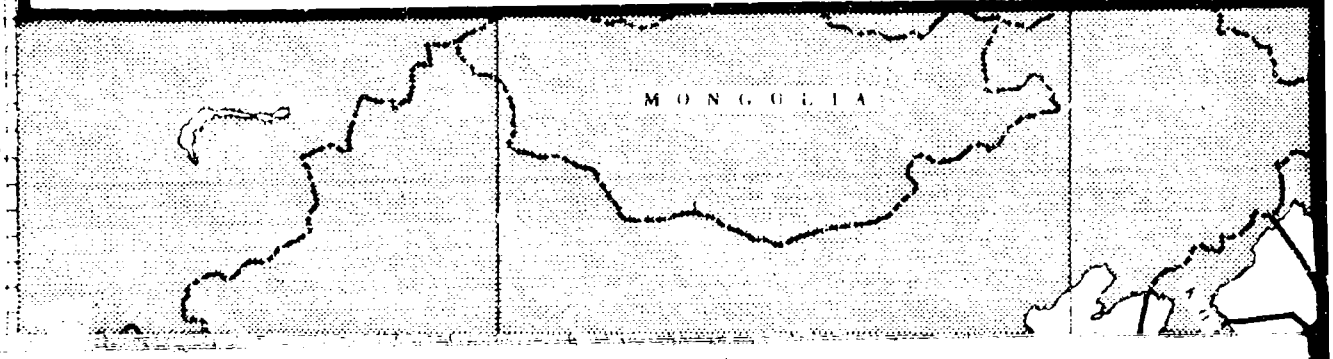
This map is an illustration of how the sea floor might look if it were divided along lines equidistant from the closest points of adjacent or opposite coastal states and islands. Proposals for such a division have been made as a basis for establishment of the exclusive rights that will be necessary for the encouragement and administration of the exploitation of deep sea minerals. The proposals are based on the open-ended criterion of exploitability, as expressed in the Geneva Convention on the Continental Shelf. These proposals ignore the widely held belief that an extension of rights must be limited by some concept of proximity.

Precision of lines is impossible because of the scale of the map, the questionable status of islands, the lack of defined base lines, and the distortions of the projection. But precision is not important because this map is designed simply to illustrate the very considerable difficulties of this (or any other) scheme for dividing the sea floor among coastal states.

December 19, 1967

Francis T. Christy, Jr. and
Henry Herfindahl

Prepared for the Law of the Sea Institute, University of Rhode Island, Kingston, R. I.



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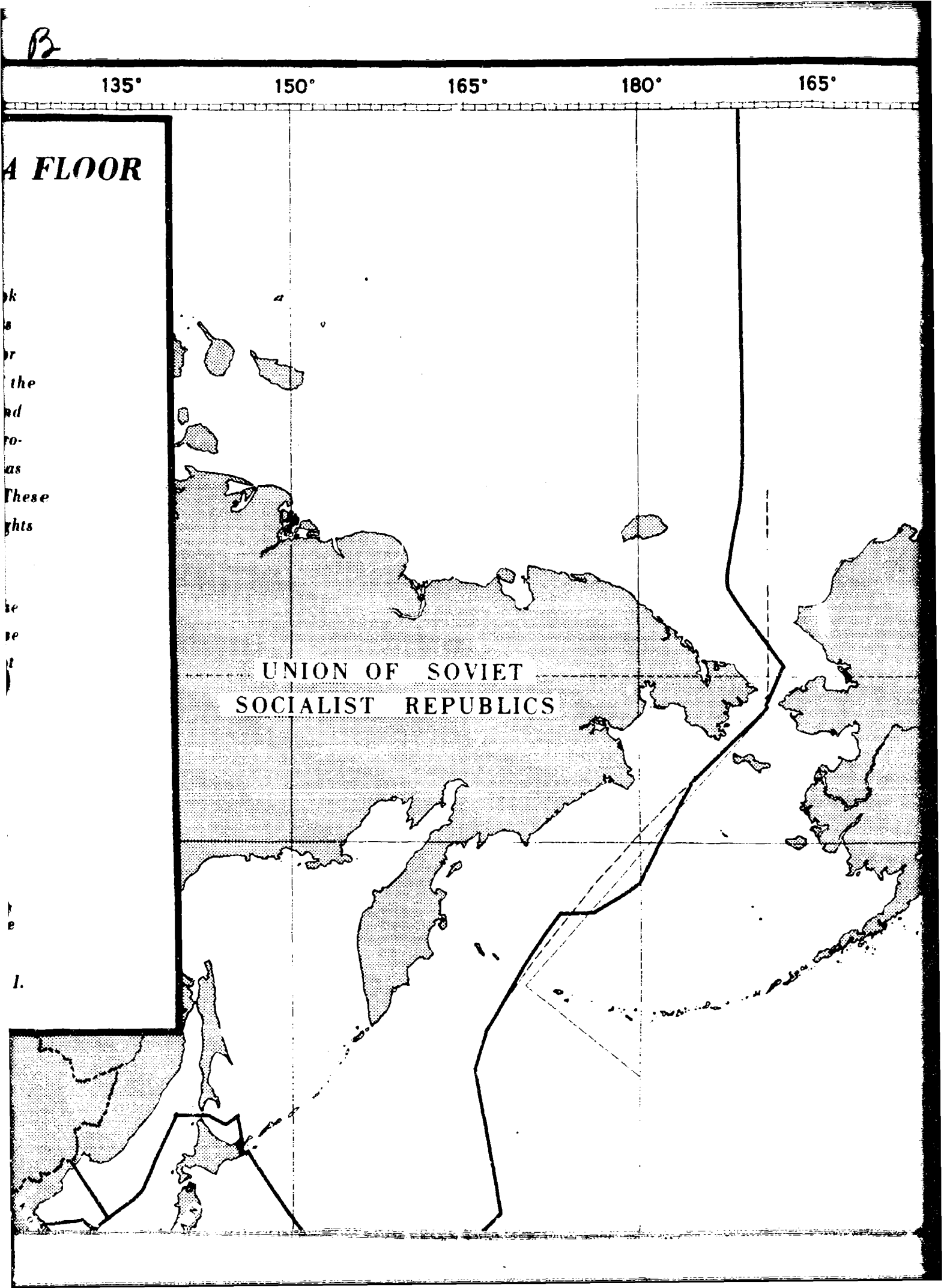

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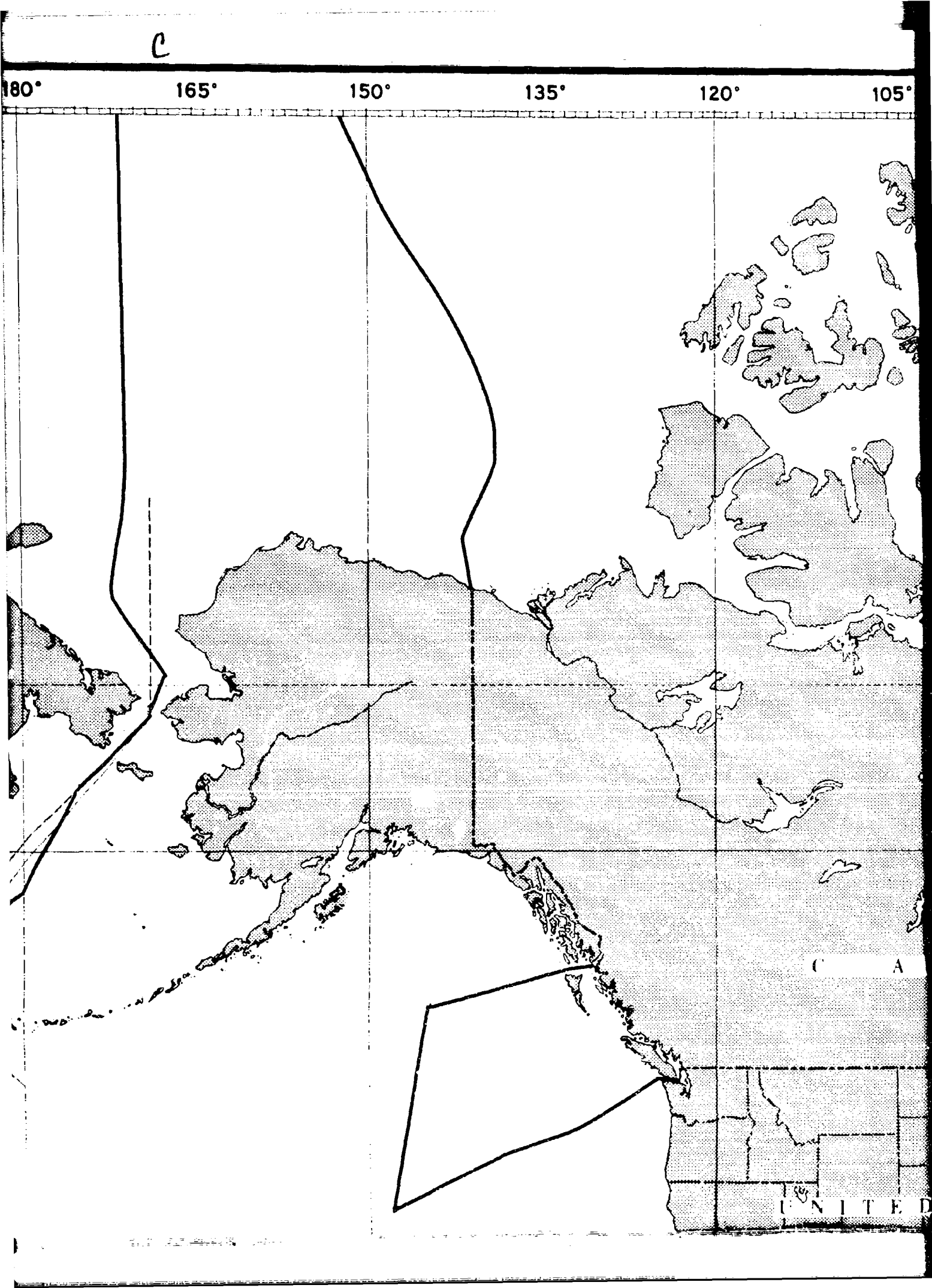

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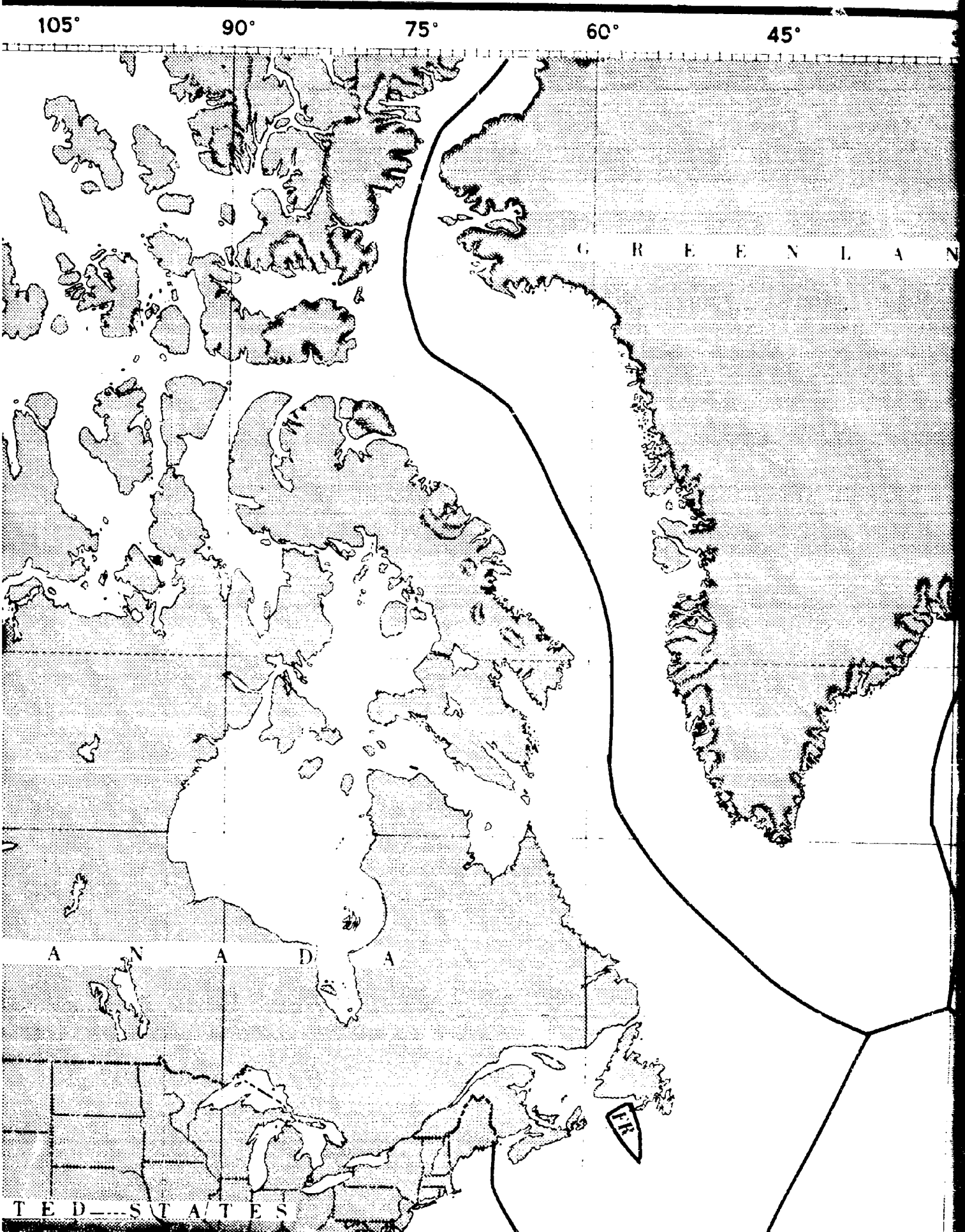

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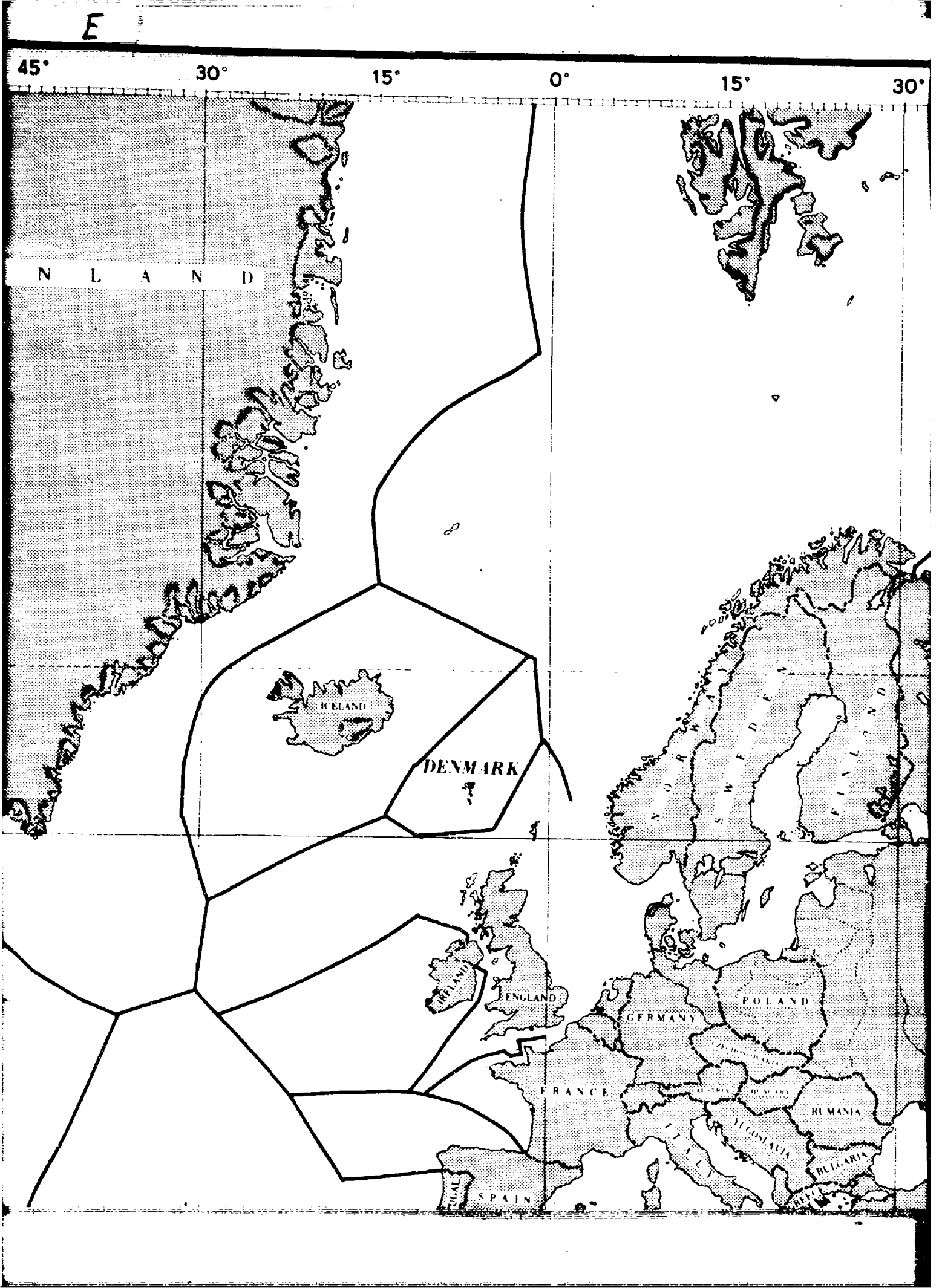
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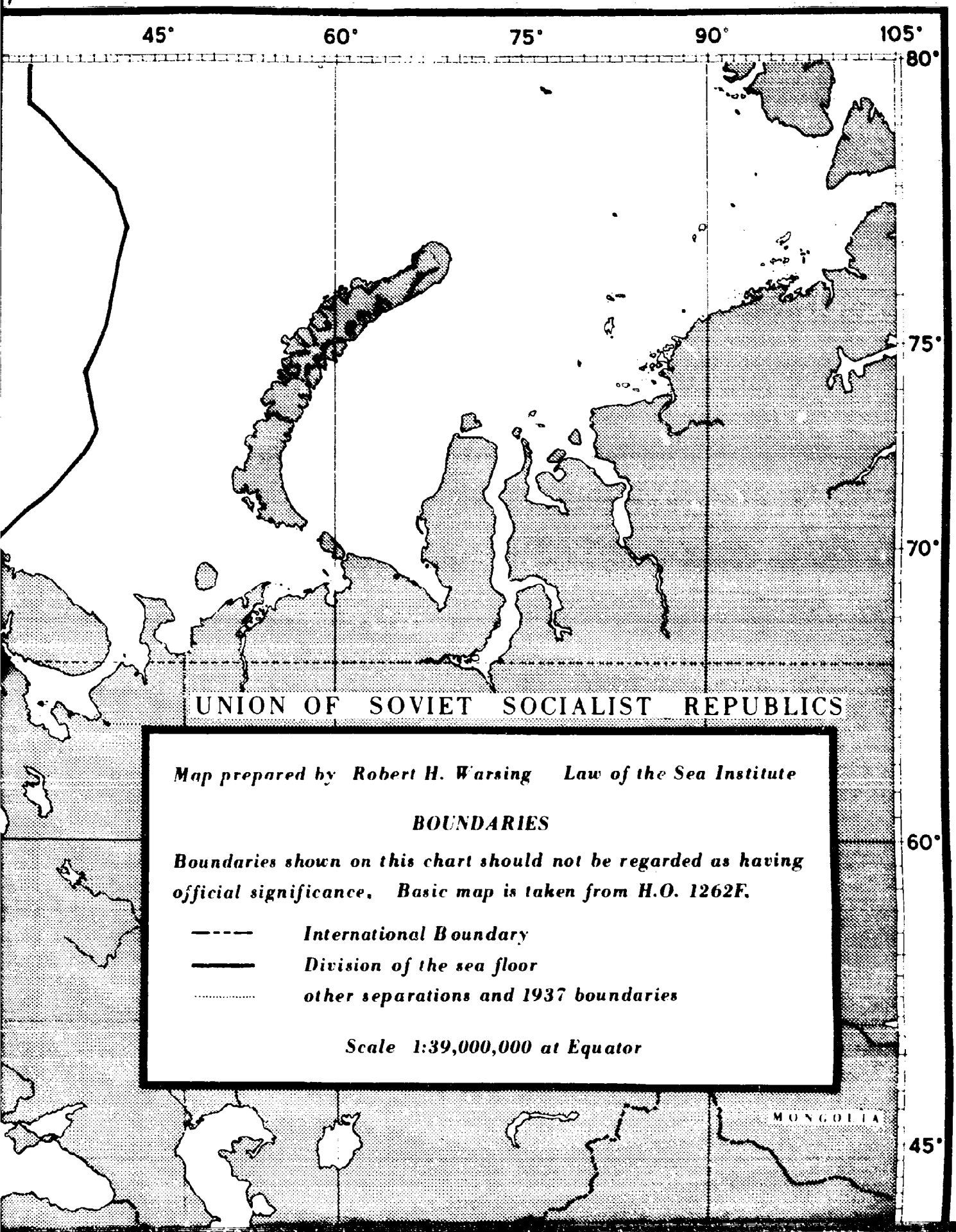


Map prepared by Robert H. Warsing Law of the Sea Institute

BOUNDARIES

Boundaries shown on this chart should not be regarded as having official significance. Basic map is taken from H.O. 1262F.

International Boundary

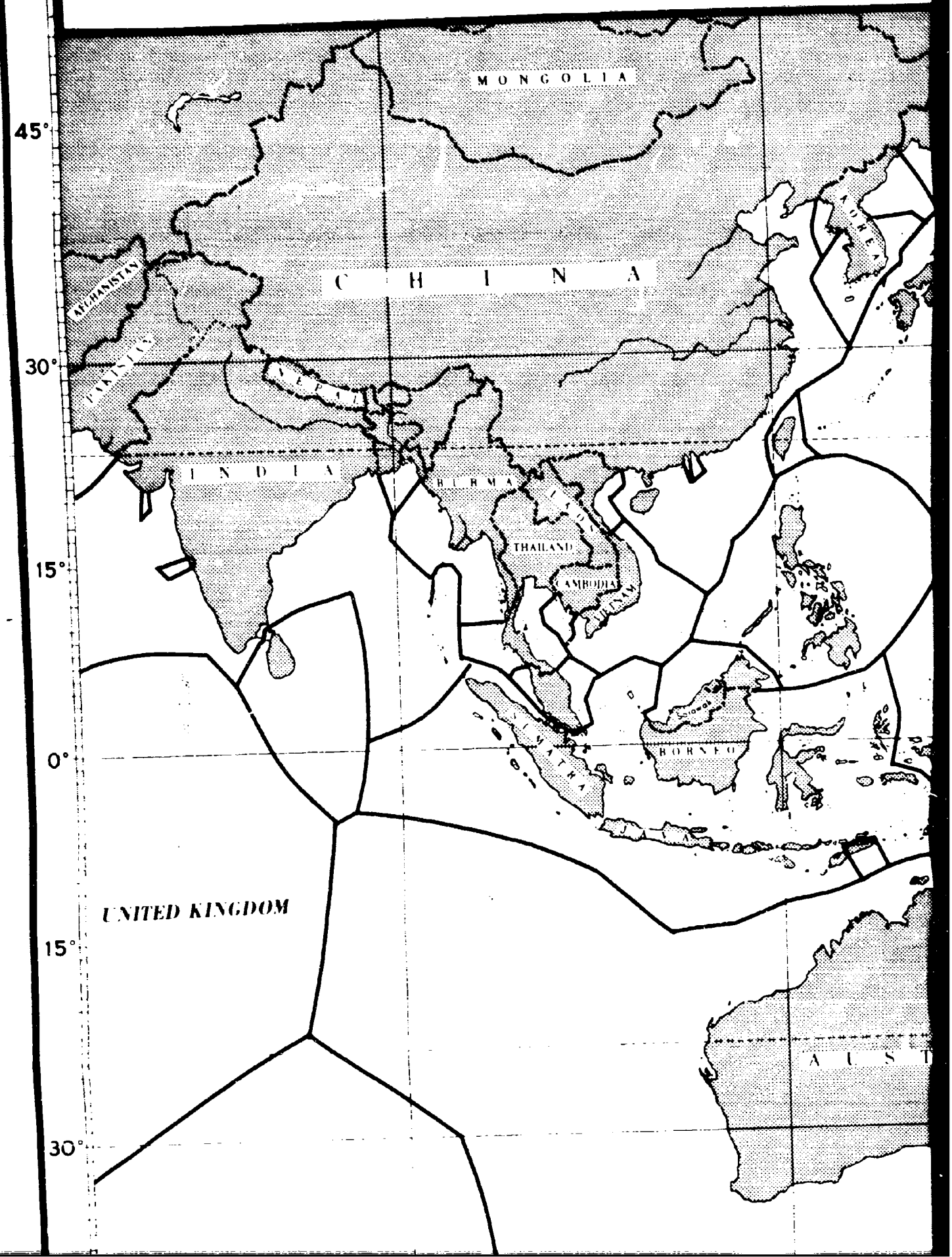
Division of the sea floor

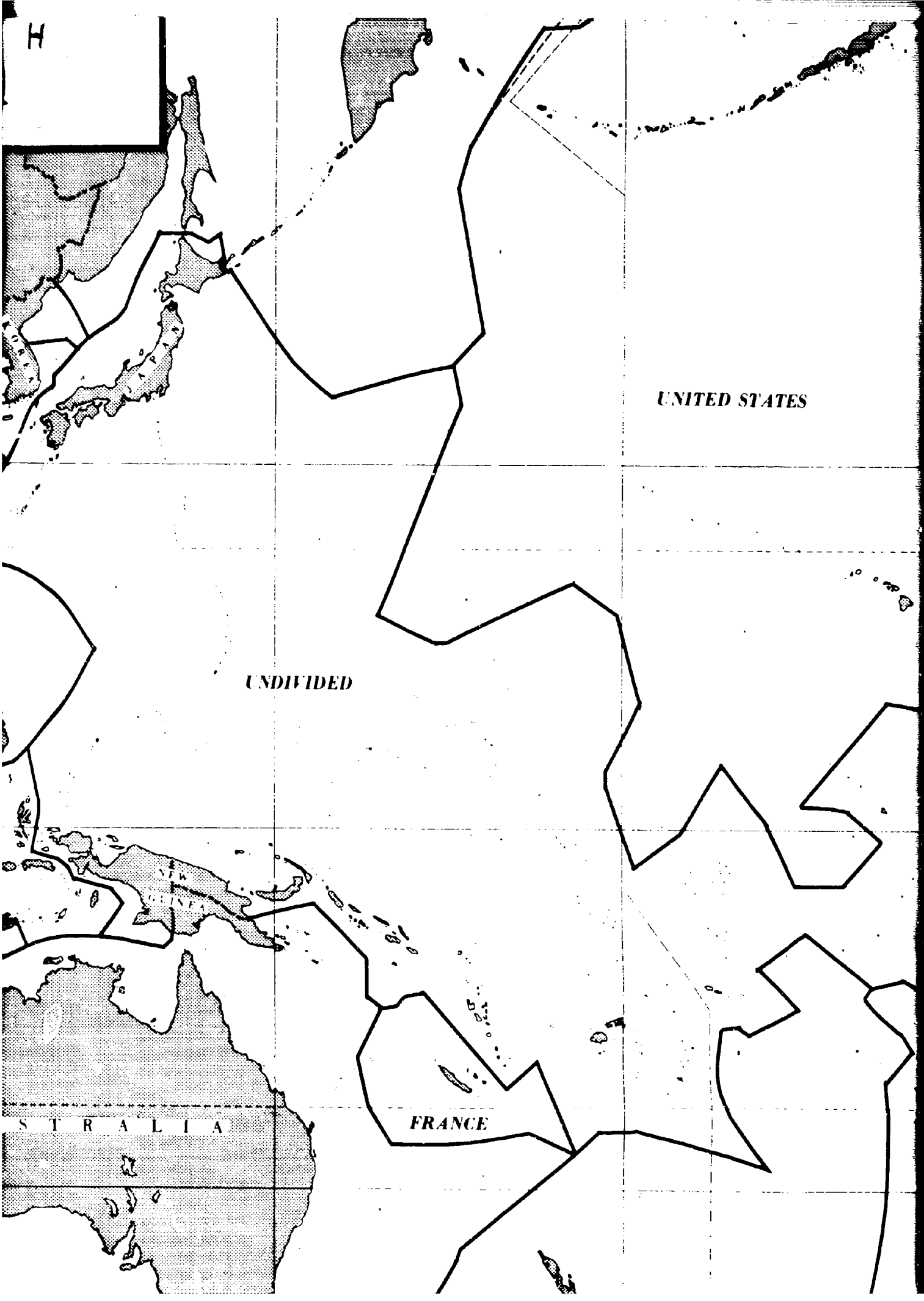
other separations and 1937 boundaries

Scale 1:39,000,000 at Equator

G

Prepared for the Law of the Sea Institute, University of Rhode Island, Kingston, R. I.

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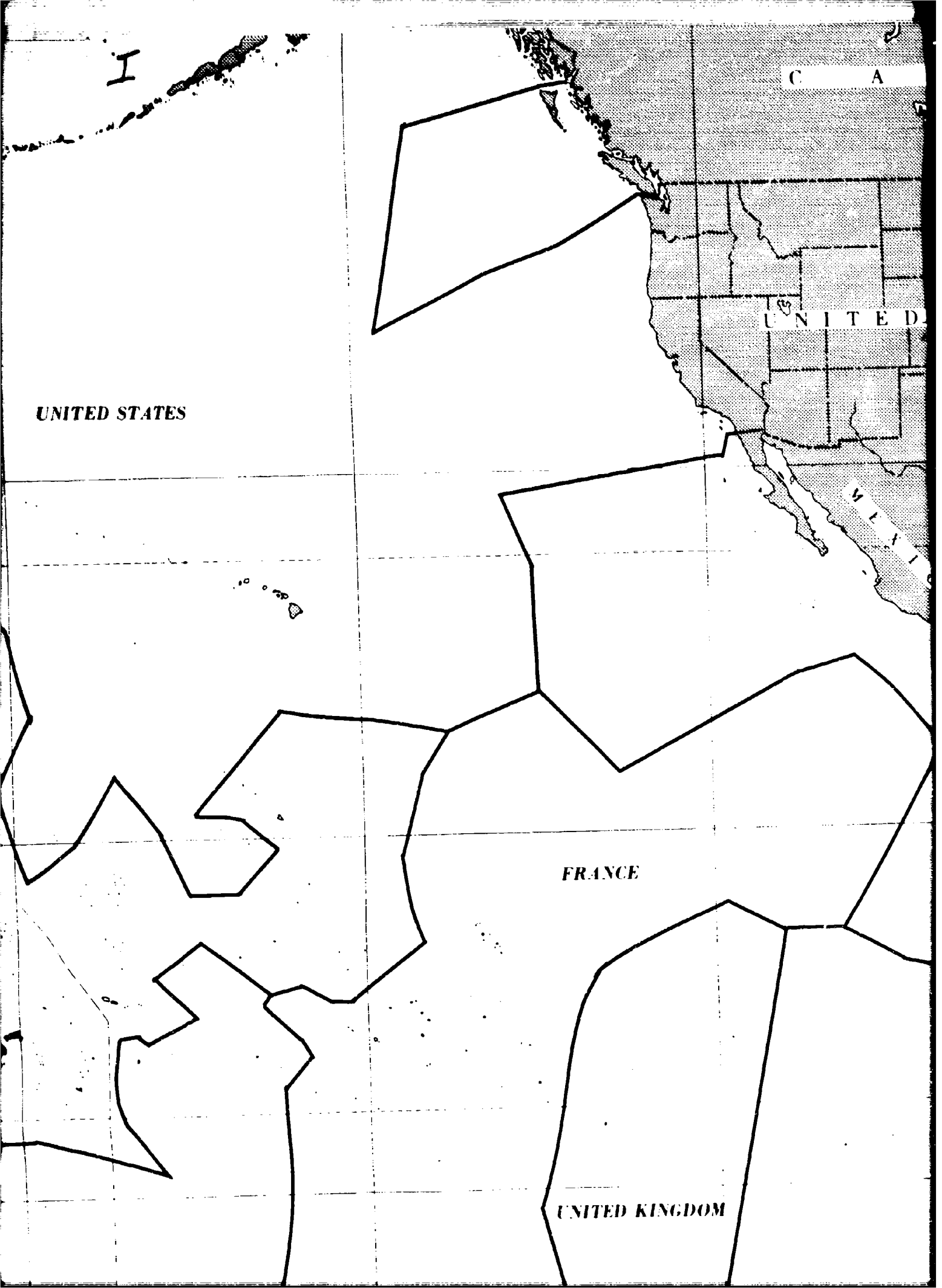
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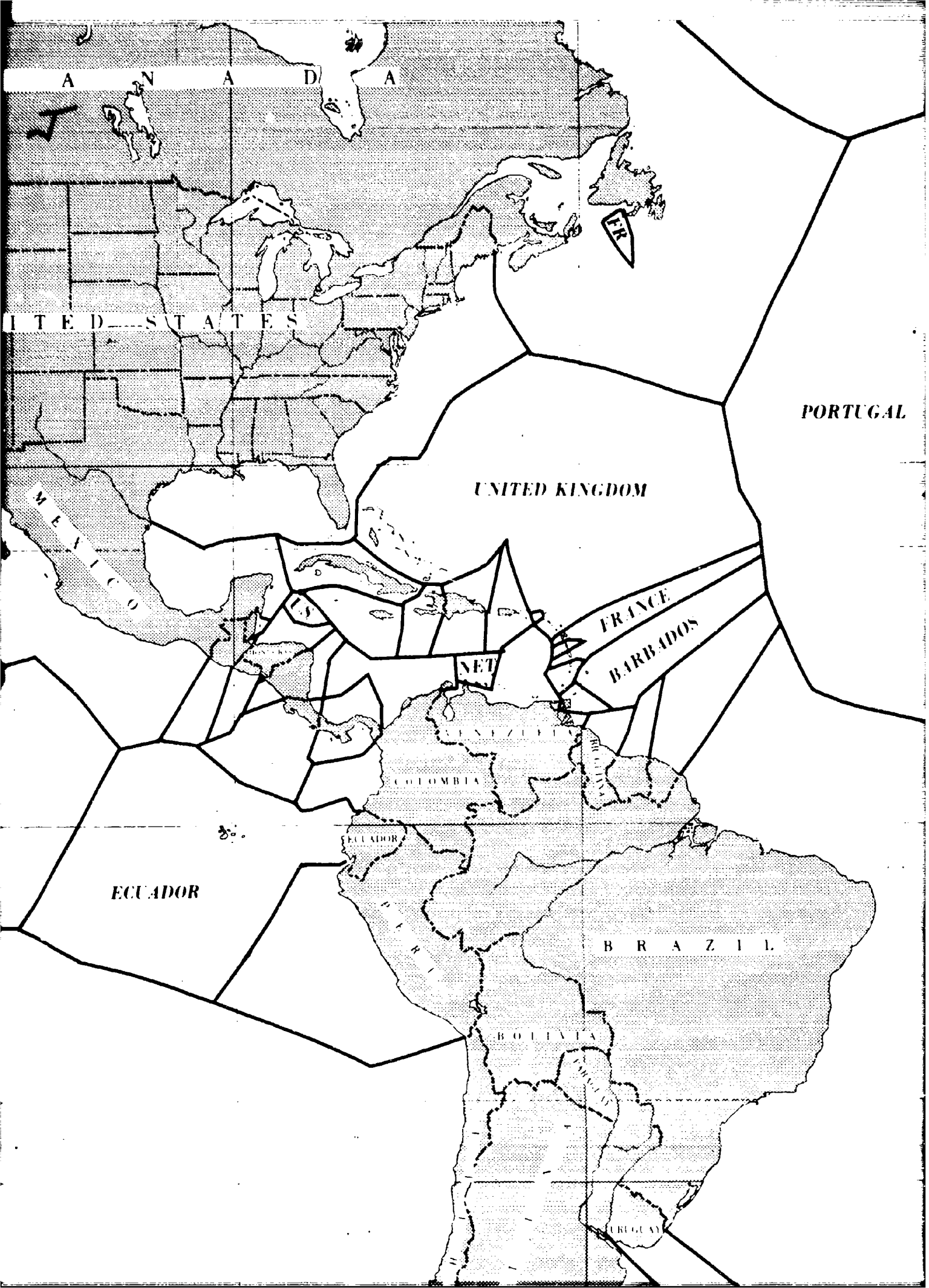
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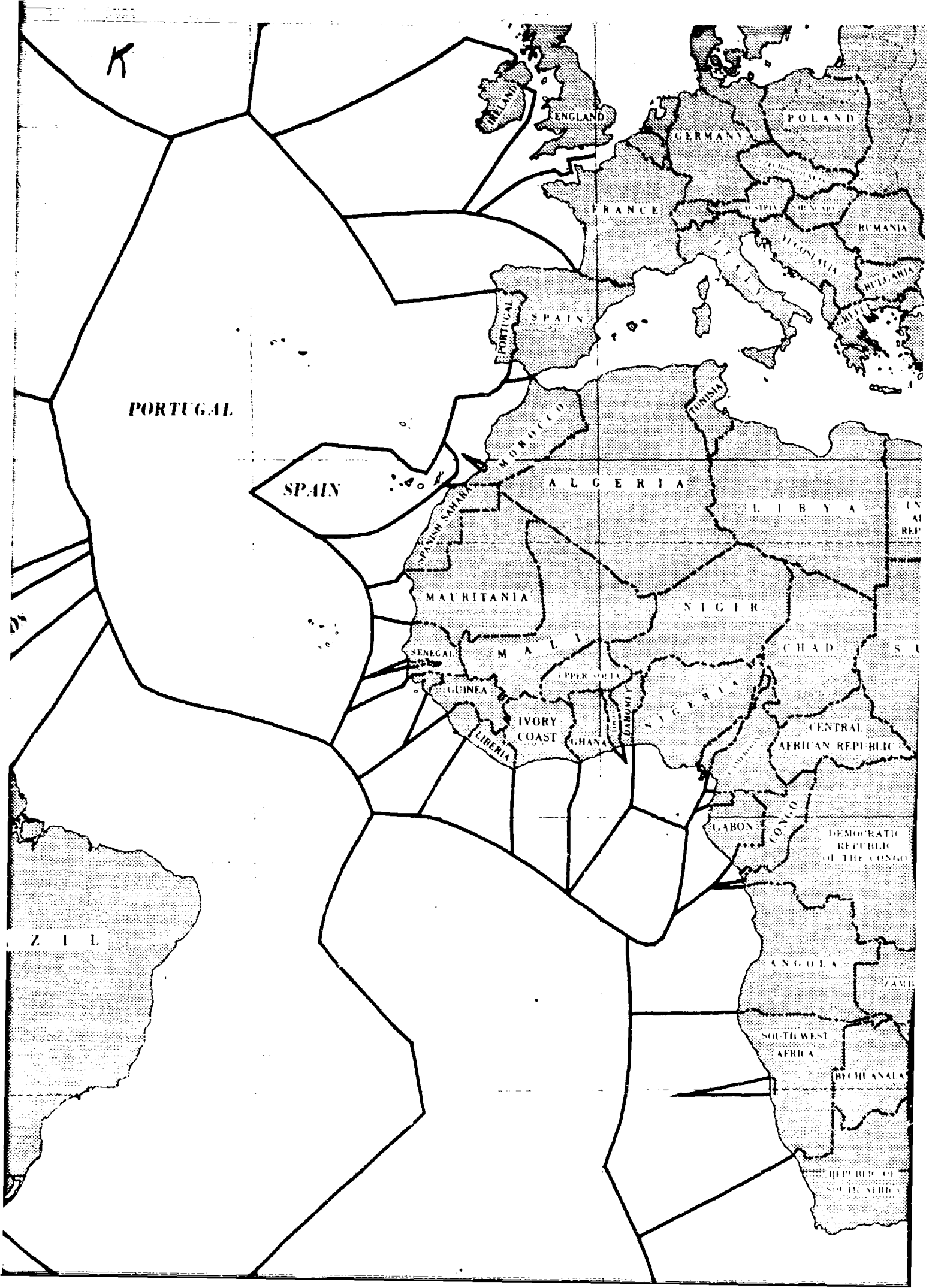
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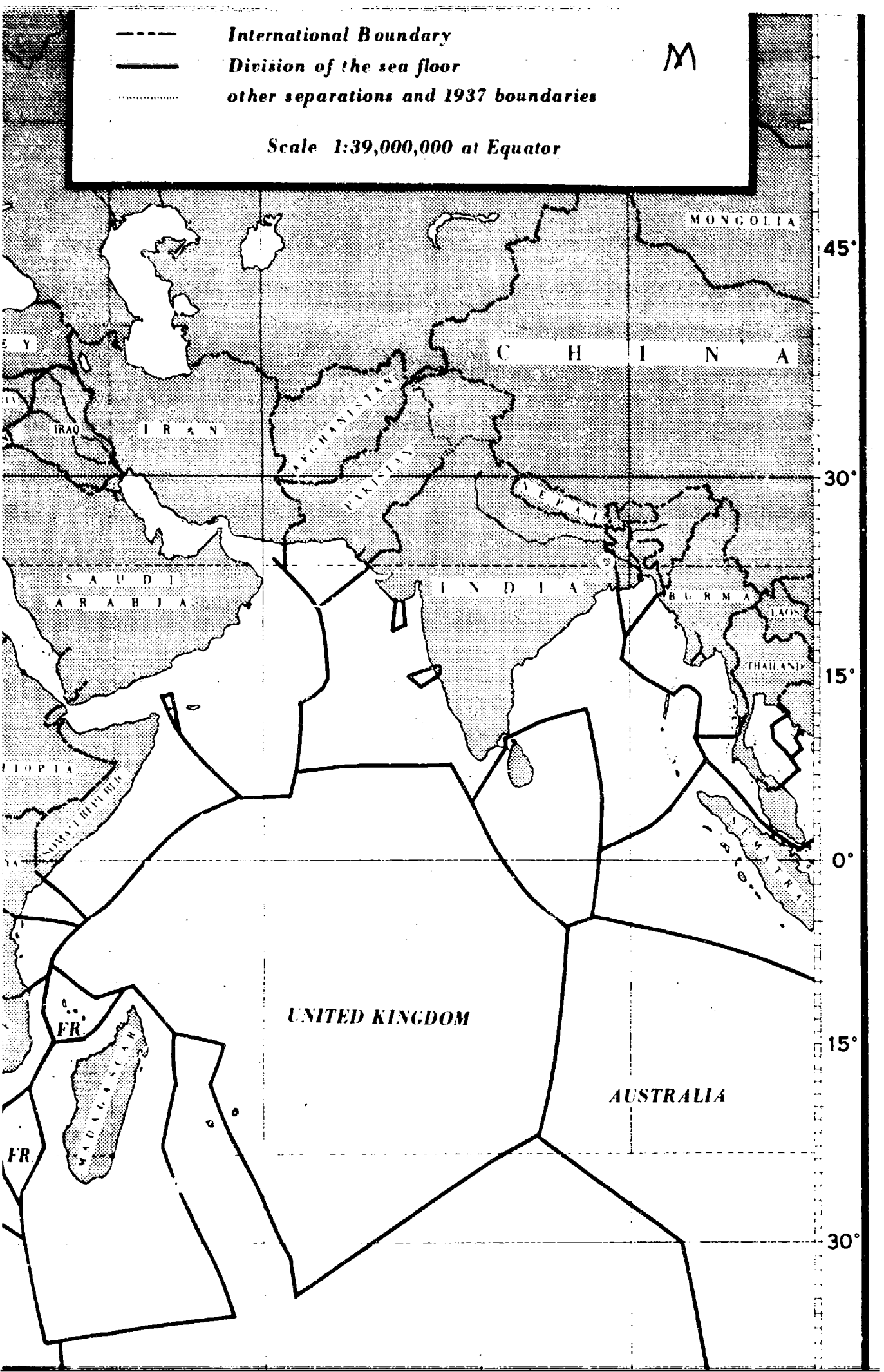
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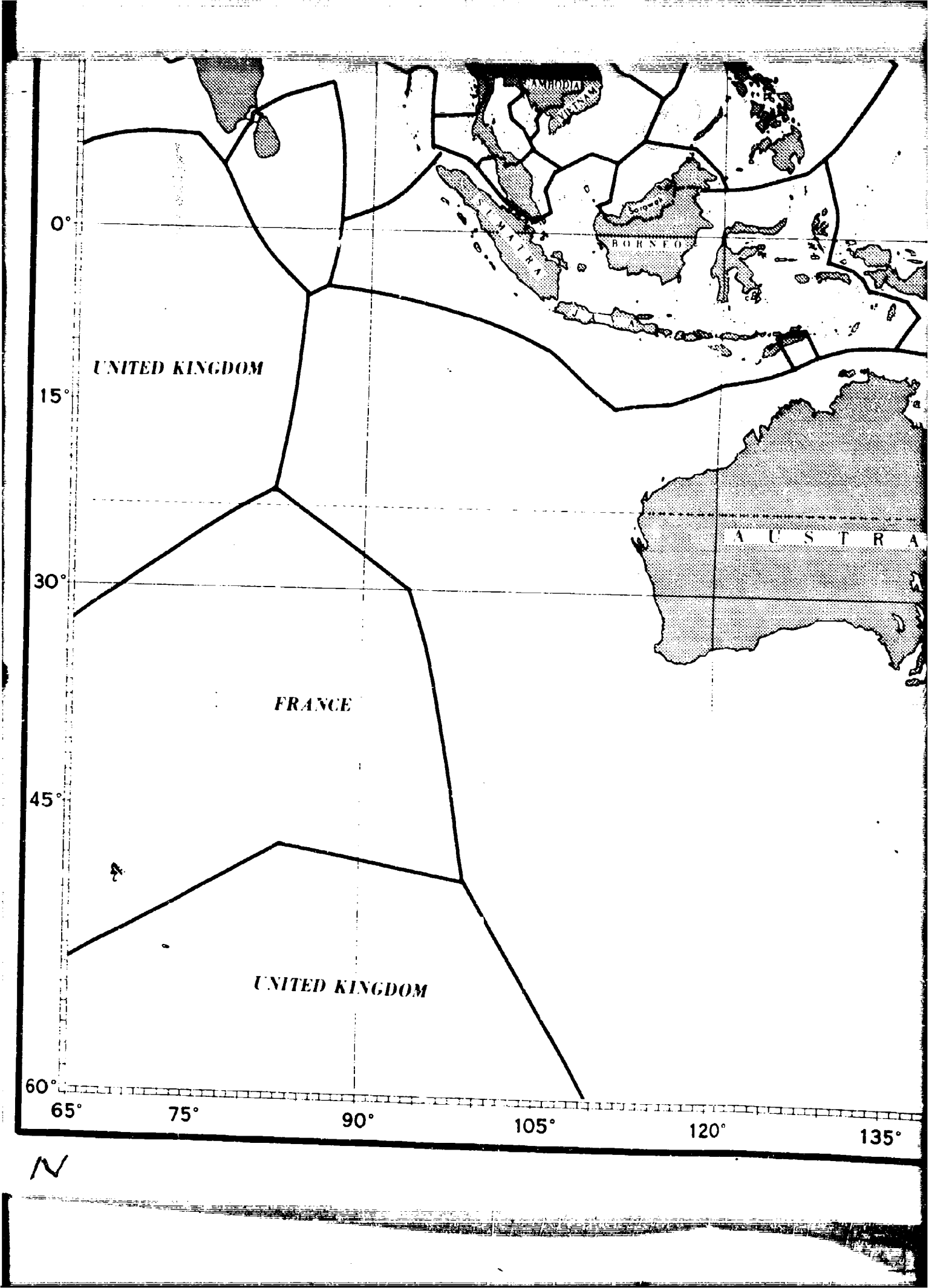
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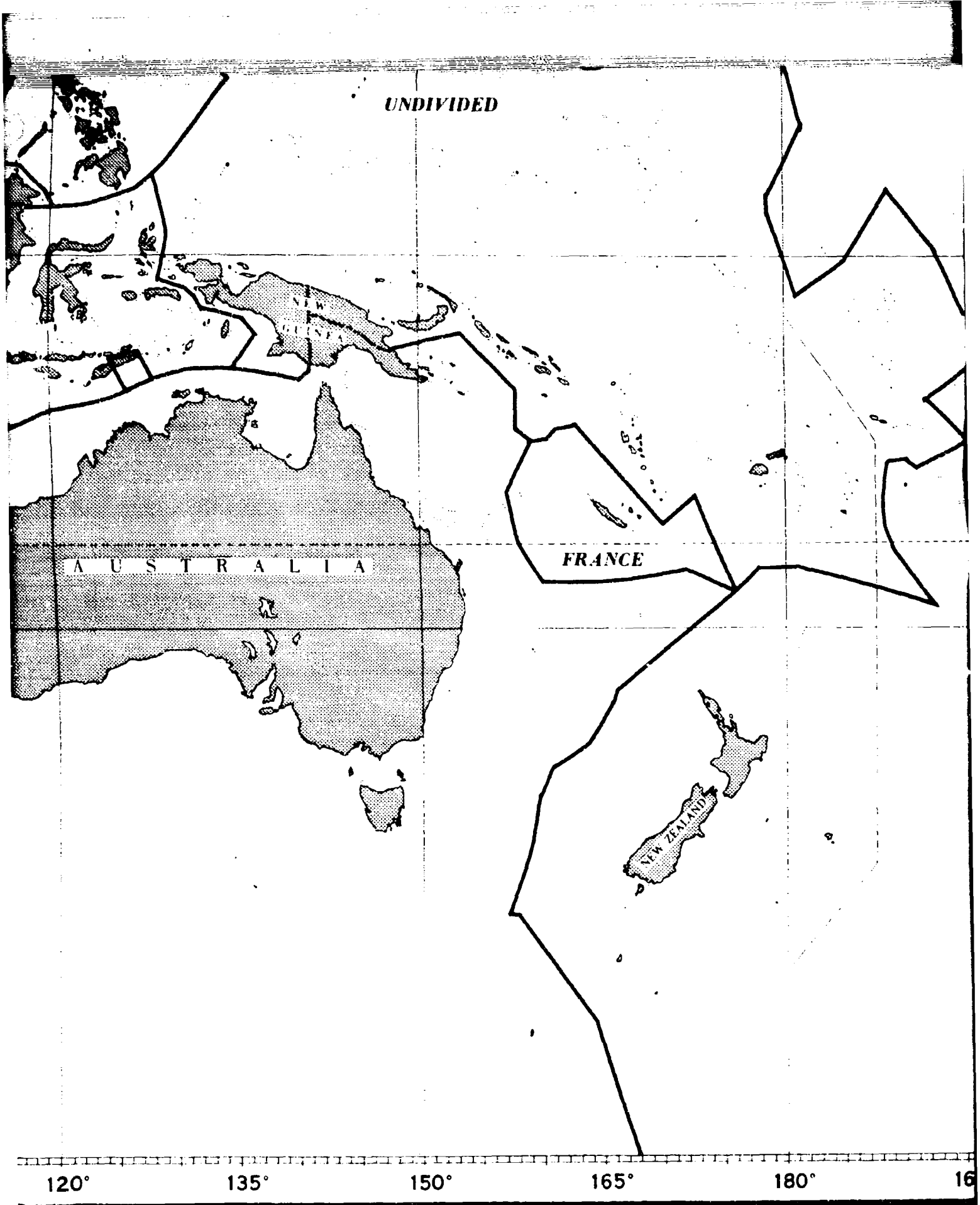
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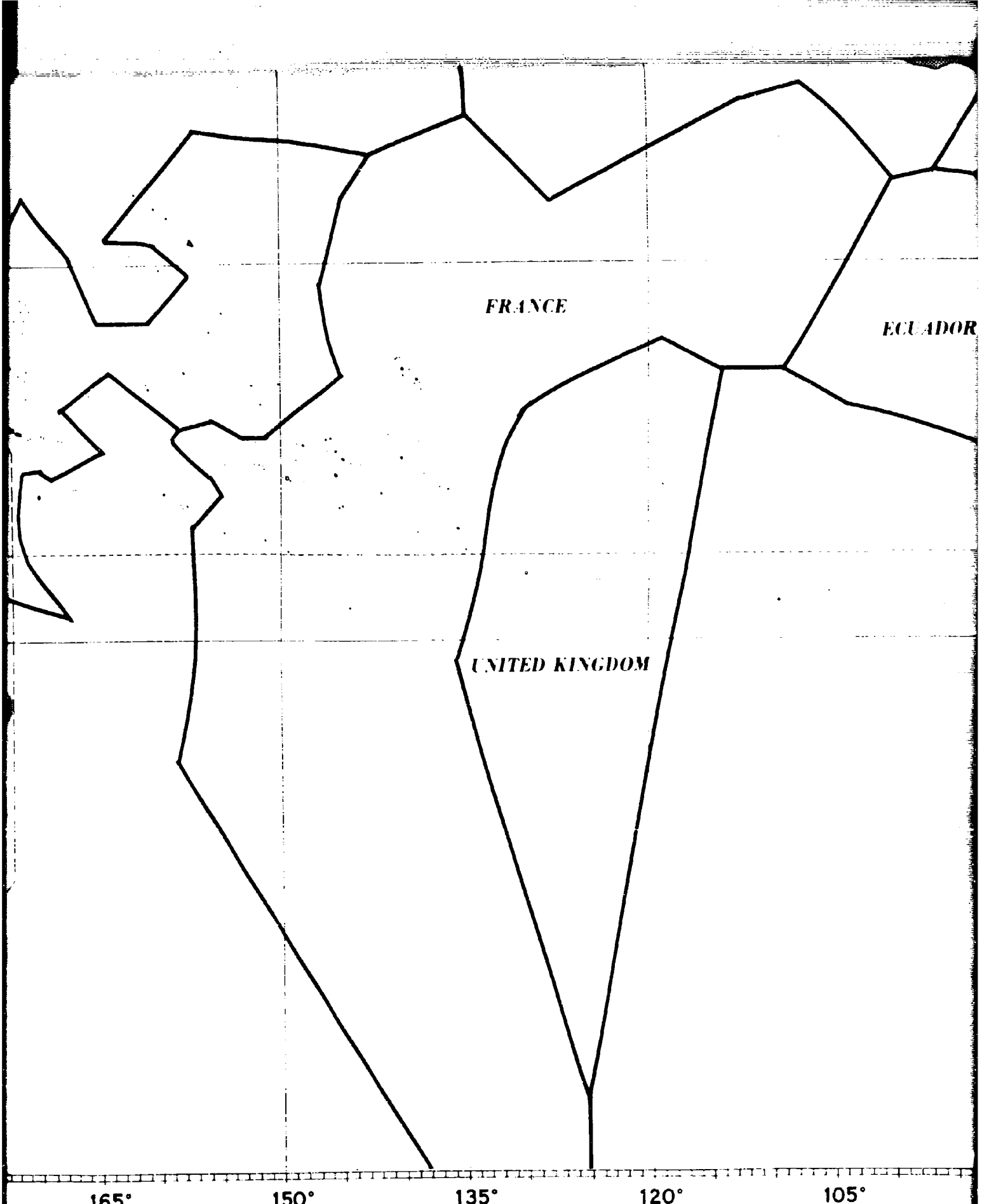

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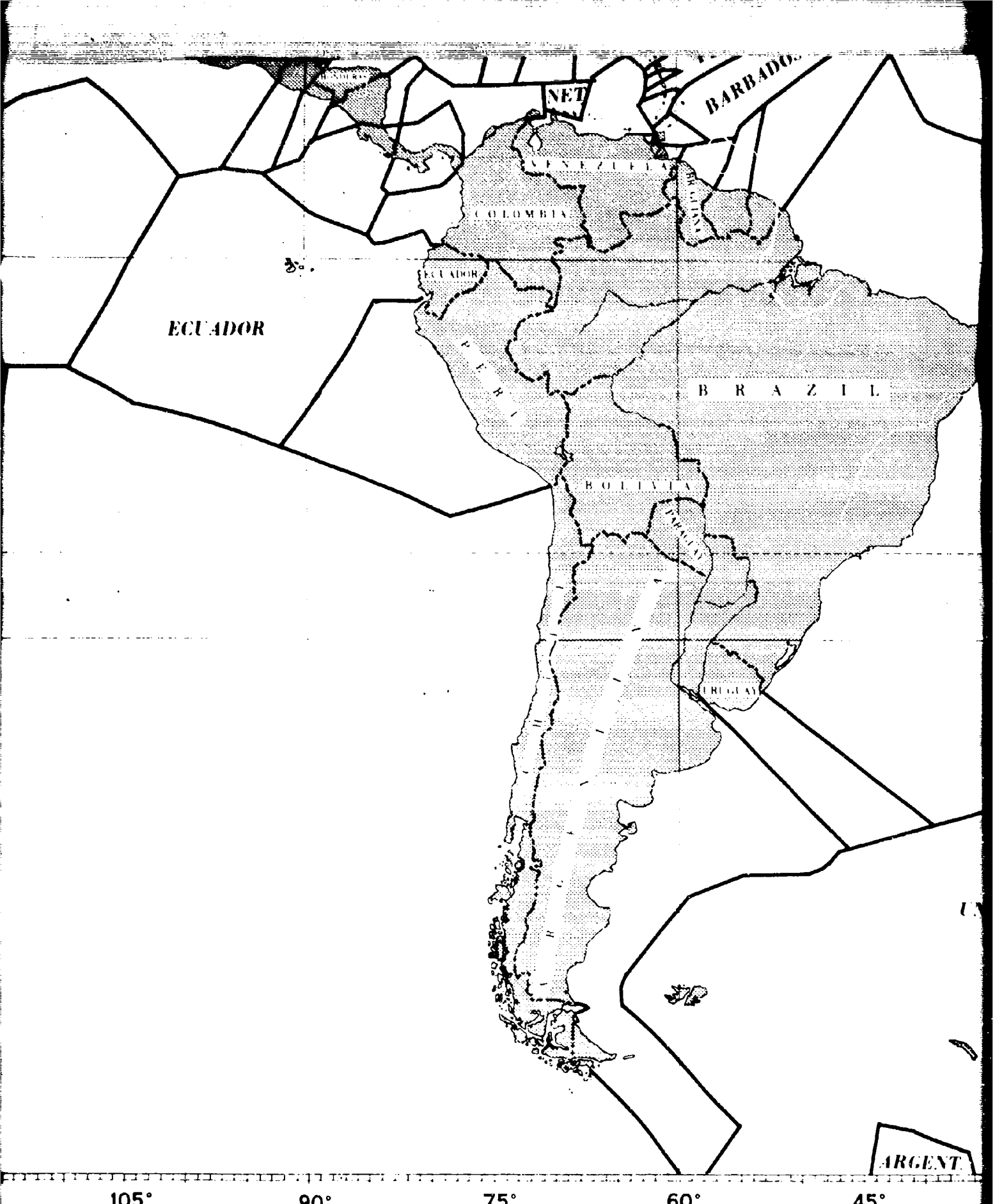
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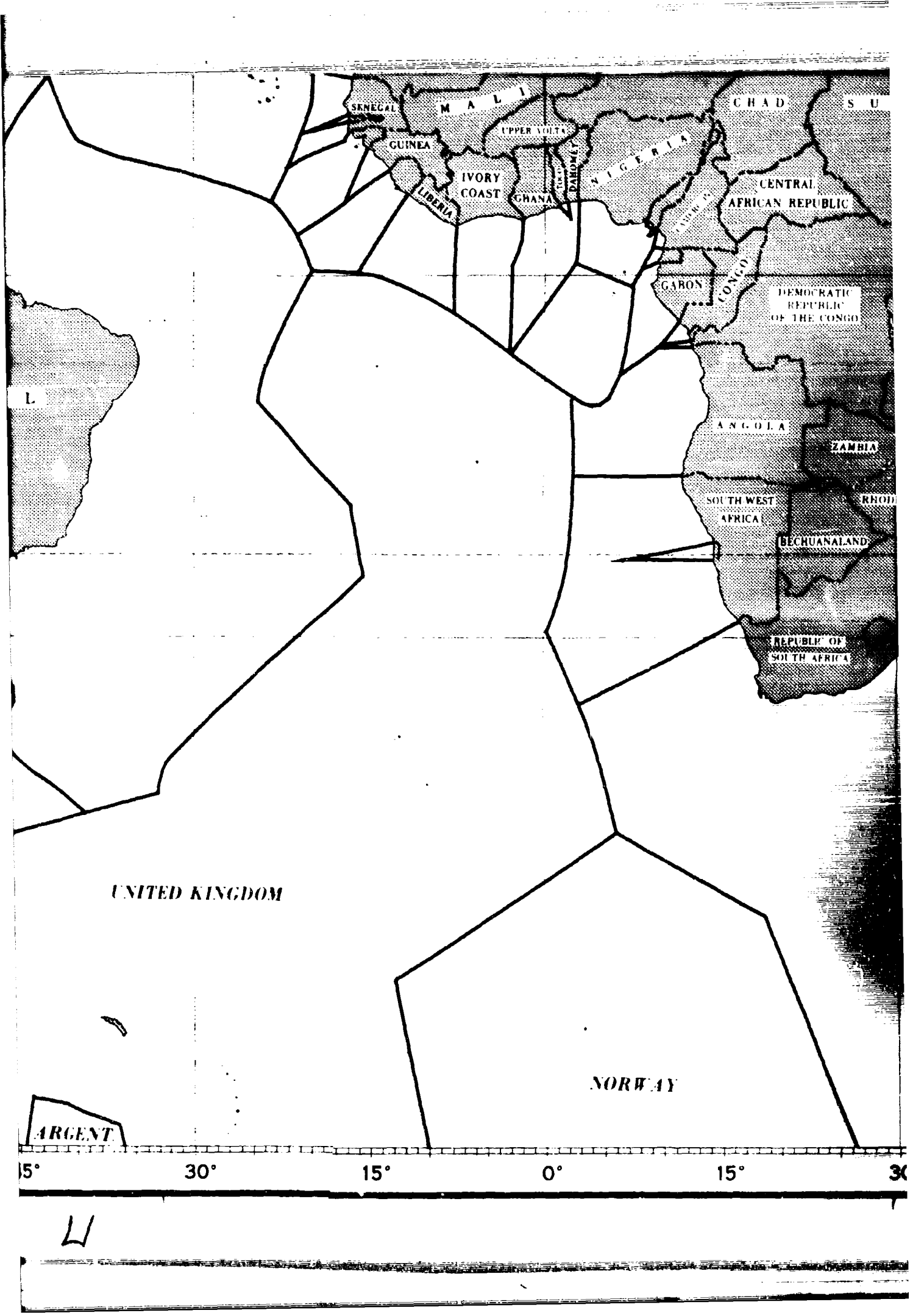
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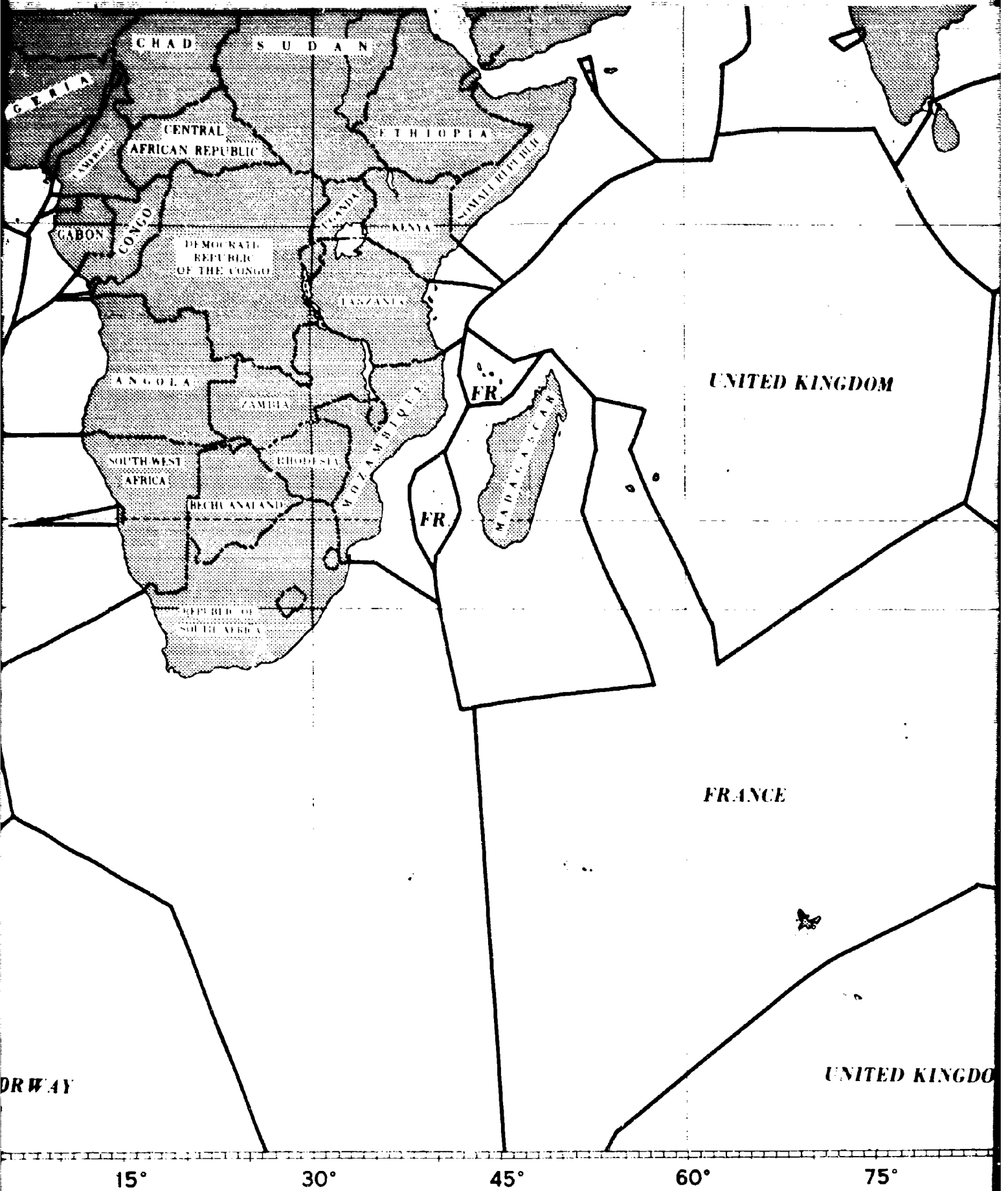
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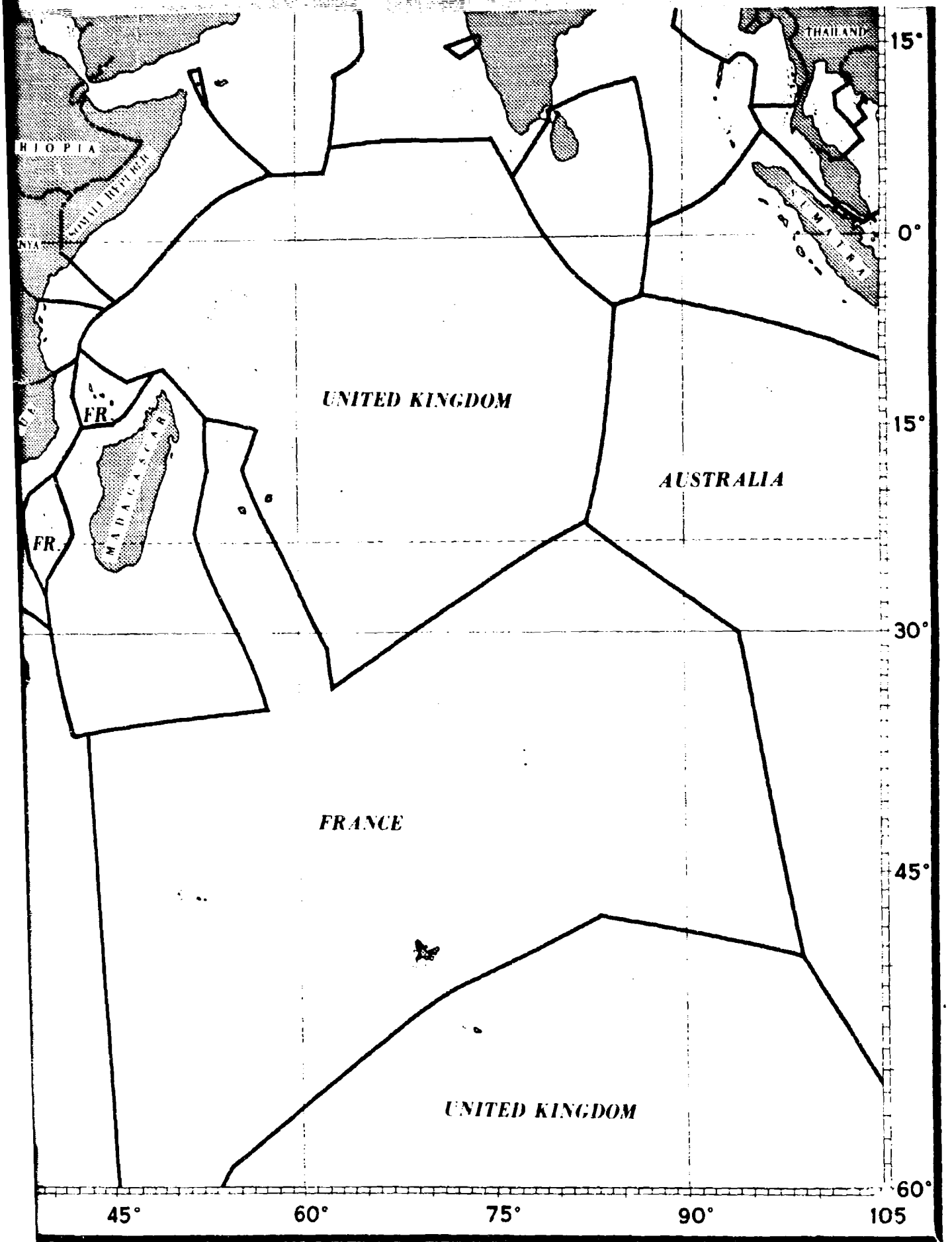

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13. ABSTRACT

The book contains the texts of twenty professional papers, as well as shorter statements by panel participants, and considerable verbatim discussions. Starting with the theme of the need for rules and rights in the use of the sea, the proceedings then go on to consideration of existing fisheries arrangements and their implications, conflicts of uses in the sea, and alternative regimes for the sea, ending with a discussion on the future development of world fisheries. In this latter connection, considerable attention was paid to the problems of U.S. jurisdiction over its fisheries resources beyond the twelve-mile limit.

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International Commission for Northwest Atlantic Fisheries						
International Council of Scientific Unions						
Manganese nodules						
Maximum net economic yield						
Maximum sustainable yield						
National fisheries quota						
North Pacific Fisheries Convention						
Northeast Atlantic Fisheries Convention						
Offshore petroleum and natural gas						
Overfishing						
Res nullius						
Res omnium communis						
Sea lanes						
UN Resolution, "Development of the Natural Resources of the Sea" (December 8, 1966)						