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While the worldwide production of the ocean fisheries has been growing at an increasing measure and is making a significant contribution to solving the world's food problem, the U.S. share in this production has been declining at an alarming rate. In order that the United States may effectively participate and compete in harvesting the ocean's marine life, it must vitalize the programs for its fishing industry. Anything less will allow this aspect of the U.S. economy to continue to decline and will forfeit any hope for the United States to effectively employ the ocean's marine life in feeding mankind.

OCEAN FISHERIES: NATIONAL INSTRUMENT FOR INTERNATIONAL STABILITY

A research paper prepared by
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INTRODUCTION

The worldwide production of ocean fisheries is growing at a rapid and steady rate. During the past 10 years the world's fish catch has almost doubled. The increasing demand for fish and the potential harvest of the oceans ensure that the fisheries will continue to maintain this growth in the future.

The world's population is growing at an alarming rate. Unfortunately, even though the fishing effort has been noteworthy, it can never feed the world. However, there is a possibility that the ocean fisheries could satisfy most of mankind's nutritional needs--his animal protein requirements. Recognizing this promise of the seas, several nations are taking unprecedented actions to harvest the protein that abounds there.

Peru, virtually absent from the fishing grounds 10 years ago, is today the world's leading fishing nation. The growth of the fisheries of the U.S.S.R. has been only slightly less spectacular. Progress in Mainland China is largely unknown. Japan, which fishes throughout nearly all the oceans, has maintained progressive growth and is in a strong second position among fishing nations. The United States, once a leader among fishing nations, has recently been displaced by Norway as the fifth largest fish producing nation.

Paradoxically, the United States, the most advanced nation in the world in marine science and in management, has been overtaken by lesser nations in harvesting the oceans. Equipment and boats are old and inefficient, incentives

for fishermen are weak, management has been ineffective, and Government interest has been apathetic. This condition exists in the face of a growing demand for fishery products which is being increasingly met by imports.

The present condition of the U.S. fishing industry will not remain unnoticed. Through legislative mandate, the United States is committed to a national program in marine science dedicated to the benefit of mankind. One of the primary areas to be given special emphasis is a new food-from-the-sea program to combat the growing specter of world hunger. This legislation marks the reversal of our declining interest in the sea.

The challenge of the seas has also been extended to others. The United States has invited all nations to join together in the exploration of the oceans and to tap its wealth and abundance. The objectives of this program have been formally set forth in the International Decade of the Ocean Exploration for the 1970's and presented to the United Nations. There are indications that many nations will respond to this challenge.

This paper will review our national policies toward the exploitation of the seas and particularly those pertaining to fisheries. Since the United States recognizes the need to rehabilitate her fishing industry, the present condition of the fishing fleet and the inclination and the ability of the nation to meet these objectives will be addressed.

The significance of fisheries cannot be appreciated by examining the U.S. industry alone. Thus, the world fishing effort, its full potential, and the influence of fisheries on the behavior of nations will also be discussed.

The value of fisheries as an instrument of national power will also be analyzed. The fishing industries of the Soviet Union and the United States will be placed in parallel to accentuate the differences in national policy. Finally,

fisheries will be discussed as a common ground for international cooperation.

I.-NATIONAL POLICIES AND COMMITMENTS

The Specter of World Hunger. Unprecedented interest is being focused on the resources of the seas. Technology to exploit them is proceeding at a rapid pace. During the next decade the world quest for scientific knowledge and advances in technology for exploitation of the seas are likely to exceed all previous efforts.

A global awakening to the opportunities of the seas was inevitable. Many land resources required to meet the needs of a developing and growing society are deficient or becoming scarce.¹ Nations must now begin to look beyond the shores for food, minerals, and even water.

Of the vital resources needed by the world population, none are more important than food. Mankind has failed to feed adequately the billions of people now living on earth. An enormous and expanding gap separates ½ billion well-nourished persons from the 1½ billion who are underfed or malnourished.²

Recent trends are equally as grim. As a result of widespread drought in 1965-1966, world food production was no greater than the previous year when there were 70 million less people to feed. Large-scale emergency shipments of grain from North America to the stricken areas have reduced grain stocks to their lowest level in over a decade. There is little food left in the granary; nations must now depend upon current production. Thus the world food situation is more precarious than at any time since the period of acute shortage during the aftermath of World War II.³

A high-yield hybrid "miracle rice," used on an experimental basis in Vietnam, shows great promise for Asian nations.⁴ The agriculture improvement that took place in India in 1968 is mostly the result of planting new high-

yield wheat and rice. Nevertheless, expansion of irrigation and fertilizer use is also required, and some experts think farm output in India has reached a temporary plateau.⁵ Superior grain will unquestionably improve the food yield, but it appears too early to arrive at any conclusions as to the impact on the world food situation. In the meantime, any improvement in India's food production appears to be matched by a growing population count.

During recent years the United States has been acutely sensitive to world food problems. This has been demonstrated through national actions and support of international programs. Substantial sums of money have been appropriated, and vast quantities of food have been exported to satisfy world needs. For example, under Public Law 480, a foreign aid program initiated in 1954, approximately \$15 billion of surplus food has been sent to more than 130 countries and territories.⁶ The successor to this program, the Food for Peace bill passed by Congress in 1966, bears a price tag of \$7.4 billion.⁷

Three successive administrations, beginning with the Eisenhower administration in 1960, have taken steps to promote international cooperation and participation as a means of combating hunger.⁸ President Kennedy initiated the "United Nations Decade of Development" in 1961. This program, addressed to State Members of the U.N. and the specialized agencies, called for unprecedented cooperation and assistance by developed nations, for sustained self-help by developing nations, and for the assistance of the U.N. in all spheres of economic growth. A salient feature of this movement was the development of measures to eliminate hunger and disease of the less-developed nations.⁹

Unfortunately, no approach yet taken up to that point—internationally, nationally, or cooperatively—has raised food output in underdeveloped coun-

tries to the level of food consumption.¹⁰

At the 1965 midpoint of the U.N. Decade of Development, an evaluation of the progress being made under this program showed dismal results. The poor were becoming poorer, and the rich were getting richer. Moreover, there was every indication that the numbers of people suffering from hunger and malnutrition would be markedly greater at the end of the program in 1970.¹¹ The goals set for this 10-year period simply will not be attained. It may be more appropriately known as the "Decade of Disappointment."¹²

This finding has been corroborated by other authorities. The President's Panel on the World Food Supply, in reviewing the composite efforts of all the U.S. foreign aid programs, the contributions of voluntary groups, and the years of activity by international organizations such as the International Bank for Reconstruction and Development (IBRD), Food and Agriculture Organization (FAO), and United Nations International Children's Emergency Fund (UNICEF), concluded that "there are more hungry mouths in the world today than ever before in history."¹³ Thus, there is overwhelming opinion that national and international efforts to allay the world food problem have failed.

The future looks equally as disturbing. Some authorities contend that massive famines are inevitable and suggest that it is too late to do anything except on a selective basis. It is also predicted that increasing civil tensions, riots, and government instability will accompany the increasing scarcity of food.¹⁴

This is a reversal of the optimism which existed several years ago. At that time, almost without exception, the rate of increase in food demand was underestimated, and the rate of increase in food production was overestimated.¹⁵ Nevertheless, with this grim shift to realism the United States is committed

to lead the world against hunger, and our national policies support this objective.¹⁶ It is in this setting that the U.S. policy with respect to the exploitation of the seas comes into focus.

Commitment to the Sea--A National Policy. The United States is clearly committed to the sea--politically. The Marine Resources and Engineering Act of 1966 provides an explicit mandate for a comprehensive, long-range, and coordinated national program in marine science. Certain portions of this act deserve mentioning. The broad objective of this legislation is "to develop, encourage, and maintain a coordinated, comprehensive, and long-range national program in marine science for the benefit of mankind, to assist in protection of health and property, enhancement of commerce, transportation, and national security, rehabilitation of our commercial fisheries, and increased utilization of these and other resources."¹⁷

The act also calls for specific courses of action to support these broad objectives. These actions, comprehensive in scope, are addressed to the many deficiencies of the U.S. marine science situation today. It should also be noted that emphasis is placed on the cooperation by the United States with other nations and international organizations in marine science activities when such cooperation is in the national interest.

A commitment to revitalize the maritime industry of the United States has also been made by the new administration. President Nixon has openly supported a national policy to strengthen all elements of seapower, thus "enabling the nation to use the world ocean advantageously for either trade or defense--its navy, its merchant shipping, its shipbuilding, its fishing, its oceanographic research, and its port facilities."¹⁸

Pursuant to this national policy, the United State has proposed that the nations of the world join together during the seventies in a cooperative pro-

gram of ocean exploration and exploitation. This program has been designated as the International Decade of Ocean Exploration.¹⁹

One of the underlying concepts of the decade is that the very size and scope of the marine environment dictate that exploratory effort be conducted on a vast scale if anything is to be accomplished within a reasonable period of time. Hence, a broad program would necessarily require the cooperative effort of many nations. The decade is also envisioned as a first step among nations in developing the future economic potential of the oceans, the base for expanded and more deliberate efforts of the future.

As might be expected, the main thrust of this movement is directed toward material objectives, to develop new sources of food for the developing nations. Concurrently, there is the idealistic objective that the cooperative effort to use the oceans will serve as a common bond among nations and a force for creating international political stability.

The U.S. commitment to the sea is loud and clear. But how will it compete with the other pressing problems of the Government which are all competing for resources? Aside from the Vietnam drain, which will take precedence, there are several dominant programs that must be considered. These include the Great Society programs, the antiballistic missile system, the outer space program, and the marine resources and engineering development program.²⁰

It is extremely doubtful that the national "back to the sea" program will overshadow these competitive programs for resources. Nevertheless, certain aspects of the marine resources program are of sufficient importance to be given early consideration. The world food problem impinges directly on potential of the world fisheries. In view of this grave situation and the direct economic and political import of a strong national

fishing industry, it is difficult to perceive that any other aspect of the U.S. marine resources and engineering program would receive a higher priority.

II--THE U.S. FISHING INDUSTRY

U.S. Fisheries--A Distressed Industry.
"We've got to stop fishing like St. Peter."

This admonition, appearing in a double page advertisement in a recent issue of several major news magazines for the nickel industry, reflects the general condition of the U.S. fishing industry.¹

In an age when the trend of industrial production is solidly upward, the downcast indices of the performance of the U.S. fishing industry are an anomaly. Moreover, this dismal picture of the U.S. fishing fleet has occurred while worldwide catches are being landed at an accelerated rate. For example, while U.S. production has dropped by 10 percent over the past 10 years, the world's fishing production has doubled.² Furthermore, the decrease in the U.S. catch has taken place in the face of a steady increase in U.S. demand.

In fact, the U.S. demand for fish is greatly exceeding its domestic capability or will to supply them. Consequently, the importation of fish rises each year. Today, the United States is the world's largest importer of fish--accounting for almost 28 percent of the world's fish imports (i.e., not caught by own fishermen).

Specifically, in 1966 U.S. fishermen accounted for only 40 percent of domestic consumption; foreign imports supplied the rest. The value of these imports was nearly \$750 million; a significant sum from the viewpoint of the balance of payment problem confronting the United States today.³

Widespread concern and indignation have been expressed over the plight of the U.S. fishing industry--perhaps ex-

ceeded only by the reaction to the deteriorated condition of the U.S. merchant marine. A special congressional study of fishery activities behind the Iron Curtain concluded that by comparison with Communist programs "our fishing industry is moribund and on the decline."⁴

The Commission on Marine Science, Engineering and Resources, in response to congressional mandate, recently completed a comprehensive survey of the nation's needs and opportunities related to the sea.⁵ After almost 2 years of study, this commission concluded that the United States must make substantial investment in understanding, exploiting, and preserving the oceans. With respect to fisheries, the nation's fishing industry was described "as primitive and inefficient in large part and hampered by overlapping, conflicting, restrictive laws throughout all levels of government." The report was also critical of the nation's dependence upon the large importation of fish to meet its needs.

These conclusions can be clearly and convincingly supported. In the first place, the U.S. fishing fleet is unquestionably old and ill equipped by modern standards. The following testimony made recently before a Subcommittee on Fisheries and Wildlife attests to this fact:⁶

A 1966 survey of the U.S. commercial fleet showed that of the nearly 14,000 documented vessels, the average age was 20 years, the average length was less than 70 feet, 92 percent had no refrigeration facilities, 84 percent had no hydraulic winches, 77 percent did not have radio direction finders, and 48 percent did not have radio telephones.

Furthermore, there is evidence that little is being done to modernize the fishing fleet, even though a new fishboat construction subsidy has been in effect since August 1964.⁷

The manpower picture is equally as depressing. The number of persons employed in the fishing industry, including

fishermen and shore workers has decreased over the years and has now become stable. Between 1950 and 1960 the fishing labor force dropped from 263,000 persons to 224,000 persons.⁸ As of 1966 there were still 224,000 persons employed in the industry.⁹ The number of fishermen required before the fishing industry can become a viable portion of the U.S. economy is not known. An annual increase in the labor force of slightly more than 1.5 percent is considered a desirable goal for balanced national growth.¹⁰ Although it is difficult to relate overall goals with those of a single industry, on the basis of a straight line projection an employment level of 330,000 persons as of 1966 would have represented a reasonable growth rate.

The reason for the decline is significant. Unlike agriculture, for example, where technology and productivity have permitted a decrease in labor force on the farms, the technology in the fishing industry has had only a minor role in reducing the number of fishermen. The lag in technology and inability to compete with other sectors of a dynamic economy, including foreign fishing industries, are the primary reasons for this decrease in manpower.¹¹

Continued failure to keep pace with increasing productivity is certain to magnify the manpower problems of most U.S. fisheries. Labor costs will likely continue to rise and the fishing industry will have to improve its efficiency enough to offset the increased costs. Most of the current fishing labor force will remain employed in the fishing industry, rather than take jobs in other industries. However, as these fishermen retire, there will be few replacements and the number of fishermen will continue to decline.

The declining strength of the U.S. fishing industry has a direct bearing on the age and wage level of the fisherman. For example, the U.S. fisherman, as represented by the New England fleet, is considerably older than the average U.S.

male worker. Almost 80 percent of Boston offshore fishermen are over 45 years old. By contrast, only 37 percent of the total U.S. labor force is over 45 years old.¹³ The average annual earnings of the U.S. fisherman, estimated to be \$5,040, is below the national average labor rate.¹⁴

In discussing manpower problems, it is also appropriate to address certain sociological and environmental conditions peculiar to the industry. Aside from being seasonal and unpredictable, fishing is also difficult and hazardous. Thus, considering the labor market today, there appears little to attract the younger generation to this line of work. Furthermore, minimum wage laws, trade unionism, and other factors that tend to improve earnings and working conditions do not appear to be well established in the fishing industry. This is demonstrated by the fact that less than 10 percent of the fishermen, as a whole, are members of unions.¹⁵

Thus, the present caliber of the labor force and the inducements of the industry provide little promise for a stronger industry—and a replacement force is not being developed.

Several factors have contributed to the inertia in the U.S. fishing industry. Foremost among these has been the attitude of the Government.

Federal legislation, dating back from the early days of the nation, prohibits the construction of U.S. fishing vessels in foreign shipyards.¹⁶ Although this legislation was designed to help the U.S. shipbuilding industry, it has imposed economic constraints on U.S. fishermen. Today, the cost of fishing vessels built in foreign yards ranges up to 45 to 50 percent of the domestic cost, with no prospect of a more favorable differential.¹⁷

In addition, the industry is handicapped by certain state conservation laws which are based on economic conditions which no longer exist.¹⁸ Many of these conservation regulations

effectively limit fishing time, nets, and the length of the fishing boats. It has been estimated that because of these conservation restrictions the use of fishing vessels is limited to 25 percent of their full potential.¹⁹ Although this estimate appears to be low and may not be representative of the entire industry, it is clear that archaic regulations adversely affect the efficiency of fishing fleets today.

Other institutional problems, reflecting inadequate Government attention to its fisheries, have been highlighted by the National Security Industrial Association.²⁰ These include the lack of basic economic research in the field of fisheries, the absence of a close supporting relationship between the Navy and the fishing industry, imposition of unrealistic administrative and safety rules on the fishing industry, and the basic inattention given by the Government to the specialized problems of the fishing industry because of its relatively small size in the total U.S. economy. However, all the troubles of the U.S. commercial fisheries cannot be blamed on the Government. For example, actions to expand markets, increase product quality, and to promote cooperation between segments of the industry are properly within the province of the industry.²¹

It could be argued that it might be to the best interests of the United States to depend upon increasing imports and to let its fishing industry "fade away." Some authorities contend that the interests of the United States and the interests of the whole world will best be served by free trade rather than by protection; and further, that import quotas or other trade barriers would mean higher prices and less freedom of choice for consumers.²² From an economic point of view this may be a feasible option. As we have seen, there are relatively few persons employed in the fishing industry within the United States, and they account for less than

one fourth of 1 percent of the labor force. The total U.S. catch, if replaced by imports, would amount to approximately \$500 million,²³ a negligible segment of the economy when compared to the country's gross national product of \$673 billion for 1967.²⁴

Thus, it could be concluded that from an economic point of view, maintaining the status quo and permitting the continued relative decline of the U.S. fishing industry would not seriously affect the overall interests of the nation.

Nevertheless, certain sectors of the U.S. fishing industry are strong and competitive; notably the tuna, shrimp, and menhaden fisheries.²⁵ These industries, particularly the tuna and shrimp fishermen managed by large companies and operating on a worldwide basis, have been able to grow in the face of increasing foreign competition.²⁶ Significantly, the tuna industry, through technology and aggressive marketing practices, continues to grow stronger and thus demonstrates that progress is possible.

This is not to suggest that the U.S. Government has remained totally unresponsive to the continued decline of most aspects of her fishing industry. Recent pressures from the domestic fishing industry have been successful in awakening Government interest and have resulted in concrete action in specific areas.

Awakening of the U.S. Fishing Industry. The first significant fishing subsidy construction under the Fishing Vessel Construction Differential Subsidy Act program was authorized by Congress in 1960.²⁷ Found to be ineffective, this program was replaced by the Fishing Fleet Improvement Act in 1964 which authorizes the Secretary of the Interior to pay up to half of the construction of a new fishing vessel.²⁸ However, this is only a nucleus for expansion since the

authorization is limited to \$10 million annually and then only for 5 years.

Despite a slow start, the prospects of the program are optimistic. During the first 2 years, a total of 37 vessels entered the program.²⁹ The first American-built factory ship was sponsored under this program. This ship, the *Seafreeze Atlantic*, a 292-foot stern trawler and fishhouse, embarked on her maiden voyage in February 1969. Built at a cost of about \$6 million, she represents a new generation of development within the U.S. fishing fleet. Significantly, the *Seafreeze Atlantic* is the first of a fleet of 10 ships that are being built or planned.³⁰

In recognition of the need to accelerate the national development of marine resources, the National Sea Grant and Program Act was signed in October 1966.³¹ This program, designed to encourage research and development through educational institutions and other institutes, laboratories, and agencies, promises to shape the future of the U.S. fishing industry to some extent. The Marine Resources Act of 1966, which provides the base for the "Sea Grant Program," will also provide a good foundation for the development of related programs. However, it must be kept in mind that the return from such programs must be considered in a long-range context.

Perhaps one of the most encouraging Government programs, recently initiated by the National Council on Marine Resources and Engineering Development, has been the initial effort to apply systems analysis techniques to the U.S. fishing industry. One of the early studies is a systems analysis of trawler operations.³² The methodology of this study, which resulted in the computation of an optimum fishing system for Boston-based haddock trawlers fishing on Georges Bank, also has application to other fisheries. Interestingly, one of the conclusions of the study was that the use of an advanced and costly fishing

system within the current biological and economic constraints of the Georges Bank haddock grounds is questionable and that the present trawlers are more effective.

The United States has made a national commitment to revitalize its commercial fisheries. This nation has also invited the nations of the world to join in a concerted program to develop the resources of the sea—particularly new sources of food.

Despite encouraging signs of progress the U.S. fishing industry, in its present condition and with the Government assistance that is now available, is incapable of responding to this challenge. Thus, timely and substantial Government patronage, far beyond the magnitude and scope of existing programs, must be provided to meet this objective.

As we have seen, several sectors of the U.S. fishing industry have been able to "go it alone." It would be wise to look in their direction for the formula that is needed for a strong fishing program.

III-SIGNIFICANCE OF FISHERIES

World Fishing Effort. The productivity of the world's fisheries is increasing each year. In 1966 the official total world catch of fish, shellfish, shrimp, and other marine life was 56.8 million metric tons—an increase of almost 87 percent over the 1956 catch of 30.4 million metric tons.¹ All told, since World War II the world output has been increasing at the rate of about 7 percent each year. With few exceptions this increase has been shared by all fishing nations. It is estimated that the top 13 major fishing nations account for about 75 percent of the world's fish production. The remaining 92 nations from whom data is collected account for the balance. The major producers are listed in table I.

Today the five major fishing countries are Peru, Japan, Mainland China,

U.S.S.R., and Norway—in that order. The United States occupies a static sixth position.²

The rise in the fish catch of Peru has been phenomenal, increasing from about ½ million metric tons in 1957 to a level that has ranged from 7 to 9 million tons for the past 4 years ending in 1966, a 16-fold increase. Virtually all of this increase is in anchovete, a small sardinelike fish that is processed into fishmeal.³

Production of Japan's far-ranging and highly integrated fishing fleet has remained healthy for the past 10 years and, though outweighed by the tonnage of Peru's catch, exceeds it in value by a factor of 10.⁴

**TABLE I—MAJOR FISHING NATIONS
 WITH CATCHES OVER 1 MILLION
 METRIC TONS in 1966^a**

Peru	8,789,000
Japan	7,077,400
^b China (Mainland)	7,000,000
U.S.S.R.	5,348,800
Norway	2,849,400
United States	2,514,600
Chile	1,383,500
India	1,376,600
Spain	1,357,400
Canada	1,348,800
Iceland	1,240,300
United Kingdom	1,066,600
Indonesia	1,001,400
Total	42,353,800

^aFood and Agriculture Organization of the United Nations, *Yearbook of Fishery Statistics, 1966* (Rome: 1967), p. a-12-a-47.

^bBased on estimate of Jan J. Solecki, *Economic Aspects of the Fishing Industry in Mainland China* (Vancouver: University of British Columbia, 1966), p. 143.

Fishery data has not been available from Mainland China since 1960 at which time its catch was very close to that of Japan and Peru. In the absence of reliable statistics a specific study, sponsored by the Office of Naval Research and the University of British

Columbia, was made to determine the output of the fishing industry in China. This survey estimated that production of China's fisheries would probably range from 5 to 7 million metric tons during the 1965-66 period, slightly less than Japan's production during this same period of time.⁵

The activity of the U.S.S.R. fishing fleet has been only slightly less spectacular than Peru's, steadily climbing each year since 1959 to a total of 5.4 million tons in 1966, almost a 100 percent increase over an 8-year time span.⁶

Much farther down the scale is Norway. Displaying a sharp rise over a 2-year period, Norway stands fifth in production at almost 3 million tons.⁷

It should be noted that almost one-third of the current catch is reduced to fishmeal, fertilizer, and other industrial purposes. Fish caught for reduction have been growing at the rate of almost 12 percent each year, whereas fish caught for food have been increasing at a lower rate of little more than 4 percent each year.⁸

Potential of Fisheries. A glance at the world's oceans reveals that the distribution of fisheries is extremely uneven. The major fishing grounds are widely scattered between Japan and the Philippines, Greenland and the British Isles, and in the Pacific waters bordering Chile, Ecuador, and Peru. Moderate fishing activity takes place in the northern Atlantic and Pacific off Canada and the United States. By contrast, the remaining major waters, particularly those surrounding the whole of Africa, the east coast of South America, and the west coast of Mexico and the United States are inactive.

Moreover, the distribution has been changing, notably because of the productivity of the southeastern Pacific waters. Virtually unknown 10 years ago, the fish from the Humboldt Current now account for one-fifth of the world's

total tonnage. This increase overshadows the catch from all other fishing grounds except those waters contiguous to the U.S.S.R.

Despite the generally accepted belief that the oceans are a source of unlimited wealth, its resources are widely scattered, forming not only the rich fishing grounds noted above but also certain barren areas almost devoid of fish. The fertility of the seas and the corresponding location of fisheries are dependent upon a number of factors such as light, nutriment, temperature, and movement of water. The conditions within a marine ecosystem are discernible to biologists and through analysis form a basis for predicting the potential productivity of specific areas of the oceans.⁹

The estimates of the potential yield of the world's oceans vary widely. Various scientific estimates range from 100 million to 2 billion metric tons of fish per year, which is 2 to 40 times the current world catch.¹⁰ Actually, the yield depends upon the nature of demand. If certain species are in great demand, it is reasonable to expect that output would be limited. On the other hand, if demand patterns shift to anything that swims the yield would be greatly increased.¹¹

On the basis of known fishery resources, Schaefer concludes that, at a conservative estimate, the world fishery production could be increased to 200 million metric tons per year with present fishing equipment¹² and with no radical developments, such as fish farming. This is approximately 4 times the present fishery harvest.

In a further analysis of the productivity of the sea in relation to the food requirements of 6 billion people (the earth's projected population at the end of the century), he is confident that the potential yield of the sea is easily adequate to satisfy man's total protein requirement and that for animal protein alone the potential yield is between 8

and 34 times the estimated requirement. This requirement is based on a per capita diet of 2,500 calories per day, 80 grams per day of total protein, and 15 grams per day of animal protein. The most critical element of the human diet is animal protein.¹³

However, William and Paul Paddock, in their grim analysis of the earth's inability to feed its future population, predict that "for the foreseeable future food from the seas will never catch up with the protein needs of the expanding population."¹⁴ This is, of course, a reflection of our present incapability to harvest the seas rather than their potential yield. Nevertheless, they see promise in the use of fishmeal as a food additive within a decade.

Potentially, one of the greatest benefits of fish is its value as a source of fish protein concentrate (FPC). FPC is a protein-rich powdered food additive that, through chemical processing which removes the oil and water, can be made from otherwise undesirable fish or trash fish. Another value of FPC, in addition to the possibility of its being produced at an extremely modest price, is that the entire fish can be used. It is estimated that the entire world's requirement for protein in 1970, over and above what is provided by the catch for fishmeal and food, could be met with an additional catch of 20 million tons--an increase of 35 to 40 percent over today's catch. The development of FPC offers tremendous opportunity for the world's fisheries.¹⁵

If we do not know how many fish are in the sea, neither do we know where they are--except in a general sense. The location of coastal areas of productivity and the major fishing grounds are generally known. The fishing grounds of the Southern Hemisphere, while relatively untouched, have been located by scientists. However, much less is known about the location of potential high seas pelagic fisheries (surface feeding fish such as the herring,

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anehovy, menhaden, tuna, and salmon).¹⁶

The Benguela Current off the east coast of Africa has been compared in potential to the rich Peruvian (Humboldt) Current.¹⁷ However, production from this area amounted to less than 2.5 million metric tons in 1966 which suggests that much more exploitation of these waters is possible.¹⁸

In summary, all nations are depending more each year on fisheries to meet their food and industrial needs. However, despite these increases in demand, the resources of the sea are largely unutilized and can contribute significantly more toward meeting the nutritional needs of the world.

Framework for Analysis of Fisheries. Having looked at some general dimensions of fisheries in terms of participation, production, and potential, what is their significance? That is, why do nations fish, and what is the influence of fisheries on the behavior of nations?

An economic, political, and scientific approach provides a broad structure for further discussion of their importance. However, a more precise classification under these general headings will be helpful.

Douglas M. Johnston, in drawing up a framework to analyze fishing disputes, considers health and wealth as the two primary objectives of fishing. Essentially, these are economic values. He also reasons that power and respect may be gained through fishing activity. These are political values. To secure these objectives he submits that it is necessary for the fishing industry to have scientific knowledge and to be technologically efficient.¹⁹

This composite framework will be followed in reviewing the importance of fisheries.

Economic Importance of Fisheries. As discussed in chapter I, the fight against hunger and disease is one of the national objectives of the United States.

Thus, in a word, health is indeed an objective of our foreign policy as well as the cornerstone of our future fishing program. Furthermore, serious efforts are being made by this country to produce FPC--the most promising means for satisfying the protein requirement of underdeveloped nations.

Health is also the primary goal of the fishing programs of the major Communist countries. We have seen the revolution that is taking place in Soviet fisheries. Fish have been given a high priority to improve the Russian diet because of the inability of agriculture to fully meet their protein requirements. Under the present 5-year plan (1966-70), the Soviets intend to increase their fishing production by 50 percent to 8.5 million tons by 1970--which would likely make the U.S.S.R. the world's leading fishing nation.²⁰

The Chinese Communist government, confronted with even a larger task of feeding an exploding population, is making every effort to expand its fishing industry. Solecki concludes that China must rely on aquatic products and imports for food, since it is very unlikely that China will be able to solve the food problem through increased agricultural production.²¹

The economic importance of fisheries varies among countries. For instance, in Iceland, which is at one extreme, fish account for about 90 percent of the country's exports. About 25 percent of the gross national product is derived from fisheries, which is approximately 5 times more than any other country.²² However, in terms of overall production, Iceland's catch in 1966, the highest in her history, was only 2 percent of the world's catch.

Peru's fisheries are also of major importance. During the last 10 years the total catch has increased nearly 27 times, from 320,000 tons to almost 9 million tons. Fishmeal exports are an essential industry, accounting for 27

percent of total exports in 1965, the year of her heaviest catch, and surpassing copper as the traditional main export.²³ Significantly, little, if any, of the fish protein is utilized in the diet of Latin Americans.²⁴

The contribution of fisheries to the economic strength of Japan, Canada, and Norway is also substantial, ranging from 12 to 18 percent of their total world exports.²⁵ But, as discussed in chapter II, the economic significance of fisheries in the United States is relatively less important than in other major fishing nations.

From the foregoing it is clear that fisheries are of vital importance to the national economies of most fishing nations even though they may not reach the dominant proportion of the fishing industry in Iceland.

A word should also be said about the potential of fisheries and the emerging Third World nations. On the basis of a recent survey sponsored by the National Council on Marine Resources and Engineering, an organization within the Executive Office of the President, it was found that with few exceptions the fishery resources of most underdeveloped nations were sufficient to meet local food needs. The survey also confirmed that the capital and technology necessary for the development of effective fishery industries were uniformly lacking. Nevertheless, governments were generally aware of the potential of fisheries, and some had taken positive steps toward supporting a fishing program.²⁶

A separate United Nations study of the fishing industry in the Arab countries confirms that fishing wealth abounds along their coasts and recommends the encouragement of a cooperative fishing program to increase the living standard of these low income countries.²⁷

Thus, it is apparent that economic force, whether in the form of health, wealth, or a combination of the two, is

the primary incentive behind national fishing efforts and will be the main motivation for future development of fisheries.

Political Value of Fisheries. The subsidiary political values of fisheries, power and respect, are more difficult to assess. However, they can be given some dimension.

The concept of power implies the means to achieve an objective and thus may be viewed as a threat to other nations security or interests. For example, the presence of Russian trawlers off the coastal waters of the United States, although fully within the strictures of international law, is viewed with alarm by the United States.

Reacting to what they consider to be another kind of threat, Chile, Ecuador, and Peru expanded their sovereignty 200 miles off their respective coasts to protect their fishing grounds against economic encroachment.²⁸ Conflicts caused by fishing within these waters have resulted in the seizure of U.S. vessels and continue unabated each year.²⁹ In order to ameliorate international tension, U.S. legislation now permits the reimbursement of U.S. fishermen for losses resulting from seizures in these waters.³⁰

International conflicts, including wars, over fishing practices and rights are a part of world history. On the other hand, it is noteworthy that through bilateral and multilateral agreements and the establishment of international organizations, conflicts have been reduced.³¹ Nevertheless, with the increasing competition among fishermen and in view of the higher stakes involved, the opportunity for conflict among nations is certain to increase.

Prominence in fishing, as in other maritime endeavors, creates national respect and prestige. It is certain that the U.S.S.R. has gained political prestige through the development of a modern and efficient fishing industry. Interest-

ingly, the numerous hearings before the congressional committees and subcommittees on the neglect of the U.S. fishing industry emphasize the low state of national prestige as much as the economic problem of the fishermen. The militancy of Chile, Ecuador, and Peru in defending their fisheries against stronger nations is, in part, a reflection of their newly acquired stature.³² Fishery claims made by South Korea and Indonesia have also been based on a desire for higher prestige.³³

Spanier, in his discussion of world politics, observes that smaller nations with no significant power potential seek prestige out of their concern for self-respect. Thus, the nations that cannot explode an atomic bomb or launch a space missile may seek some measure of international recognition and prestige through an aggressive fishing program.³⁴

Science and Technology--Foundation of Progress. International competition for fish is matched by the international effort to gain knowledge about the oceans. In this regard, Johnston postulates that the success of fishing industries depends upon two values: knowledge and efficiency. He explains that knowledge stems from marine science research and that efficiency in the fishing process is the product of technology.³⁵

Research in ocean sciences, motivated primarily by defense needs, has reached unprecedented levels. The United States and the U.S.S.R. are the leading nations in the field of oceanography and have attained approximate parity in this field. However, the quality and emphasis of Soviet research in support of fisheries exceeds that of the United States.³⁶ Chapman contends that in the past 10 years the Russians have done more toward the application of modern science and technology to ocean fishing than ever before and that all other major nations are intensifying

and expanding their long-range fishing capabilities.³⁷

Interests in marine science know no national borders and are shared by scientists all over the world. For example, during 1967 the Directorate of Fisheries Research in Great Britain had numerous scientists participating in a wide variety of international meetings and working abroad and was visited by representatives from 10 nations, including Poland and the U.S.S.R.³⁸ This is illustrative of the universality of marine science endeavors.

The fishing process today is basically the same as that of the earliest fishermen; that is, fish are still hunted and caught from independent boats with nets and hooks. However, substantial technological improvements have been made in gear, transportation, and preservation.³⁹ There are two major trends in technology that are significant. One is the increased use and development of fleet operations, that is, the use of organized and centrally controlled fishing fleets, pooling their knowledge and techniques, primarily by the Japanese and Russians. The other is the worldwide extension of effort, supported by the use of large factory ships.⁴⁰ These advancements have not yet reached most of the low income nations which are still dependent upon traditional processes.

From the above it is clear that significant progress has been made in marine science to benefit the fishing industry. Nevertheless, no quantum advancement has been made. There are many important areas of ocean research useful to fisheries which are not understood. These obscure areas include air-sea interactions which directly influence fish productivity, the nature of the thermocline, internal wave action and bottom temperature and their effect on fish concentrations, fish behavior and migration, and a number of other complex phenomena which will require a higher level of effort and cooperation

than is now available.⁴¹ Further, the ultimate technology needed for efficient fishing—which would provide for controlled farming and systematic hulk harvesting of fish and would replace fishing as it is known today—is still far away.⁴²

Significance of Fisheries—A Summary. In summary, it can be seen that economic, political, and scientific aspects of fisheries are highly interrelated and that an overall assessment of the importance of fisheries to nations cannot be based on the dominant economic values of health and wealth alone, but must include the political considerations of power and respect. In addition, it is also clear that the level of national interests in fisheries is dependent upon progress in science and technology. Thus, a national commitment to world prominence in fishing necessarily implies a heavy involvement in international politics and its attendant benefits and problems.

IV.—OCEAN FISHERIES AS AN INSTRUMENT OF NATIONAL POWER

National Power Defined. Holsti, in his analysis of international politics, defines power as “the means by which all states influence the behavior of others so as to protect and extend their own interests.” He also explains that when the actions to gain or defend these interests take on a pattern and are directed toward some specific objectives or values, they constitute a foreign policy.¹

The extent to which a nation influences another, of course depends upon its capabilities, that is, its strength. Political textbooks abound in comparative data relating to demographic, geographic, and economic “elements of power.” They also emphasize that less materialistic elements such as a nation’s history, its temperament, and its attitude may be a better gauge of its actual influence.

In turn, the influence of a nation may be exercised in various forms, including the offer and granting of rewards, the threat and imposition of punishments, and the use of force. Nevertheless, the main thrust of this academic discussion is that in international politics we are interested primarily in one process: How one state influences the behavior of another in its own interest.²

How then do the fisheries of the United States fit into this discussion?

Perhaps the best way to think of fisheries as an instrument of foreign policy is to first see how they are being used in this capacity by other nations. We need look no further than the Soviet Union. Accordingly, let us proceed to review the Soviet fishing industry and its political, economical, and military influence.

Soviet Fisheries as an Instrument of National Policy. The Soviet Union is committed to the growing exploitation of the ocean’s fisheries. This expansion is not subject to the vagaries of marketing conditions, but is geared to the attainment of the specific goals and quotas of authoritative and ideological planning.

For example, the Seven-Year Plan of the Soviet Union, which provided the foundation for the spectacular growth of fisheries during the years 1959-1965, was to: “Represent a decisive step towards the creation of the material-technical base for Communism, and also towards the fulfillment of the main economic task of the USSR—to catch up with and to overtake the most highly developed Western States which have the highest production rate per capita.”³

A new Soviet Five-Year Plan (1966-1970) for the development of the fishing industry was adopted in April 1966. This plan provides for a 50 percent increase over the 1965 fishery landings or a total of 8.5 million tons by

1970. Up to 90 percent of this catch would be from the high seas.⁴ Thus, within the next few years the Soviet fishing program is likely to be the largest in the world.

A more recent congressional study concerned with the changing strategic naval balance between the U.S.S.R. and the United States concluded that "the Soviet fishing fleet clearly reveals the U.S.S.R.'s goal of domination at sea." Whatever one may think of this evaluation, the report also indicated that since 1954 the Soviet Union had invested 4 billion rubles in its fishing fleet and fishing industrial facilities ashore.⁵ By way of general comparison, the total U.S. investment in fishing craft and shore facilities for processing the fishing harvest totaled about \$1.4 billion in 1964.⁶ In this regard, the position is held by some that the Soviet Union has already all but won the battle of the fishing grounds.⁷

There are a number of political spin-offs from Soviet prominence in ocean fisheries. They actively participate in international oceanographic organizations which provide an opportunity to keep abreast of scientific developments as well as to gain prestige in the ocean community.⁸ Their scientific advancement and far-ranging operations have also given them many opportunities to provide technical assistance to a number of less-developed countries. In addition to holding training courses in the Soviet Union for foreign representatives, large fishery development projects have been offered to many underdeveloped countries; and trade agreements for the sale of frozen fish have been made with a number of countries in Africa.⁹

From the above it is apparent that the Soviet Union is receiving substantial political dividends from its investment in fisheries.

The growth of Soviet fisheries has affected the economy of other fishing nations. For example, in 1960 one-half of Iceland's fishery revenue came from

the Soviet Union and satellites. Within a year, because of Russia's increased fishing effort, exports from Iceland were reduced by half, requiring Iceland to find new markets for \$5 million of fish products. This situation, coupled with a slump in Iceland's 1963 catch, had created a \$10 million adverse trade balance—a sizable problem for a small nation.¹⁰ There is no indication that this was a discriminatory action. Nevertheless, there is evidence of deliberate harassment of Norwegian fishermen in the Barents Sea which forced them to use less fertile fishing grounds.¹¹ Further denial of fishing waters could take place at any time. As for other areas, a recent economic survey of South-West Africa, for example, warns that the whole future of their fishing industry is being increasingly threatened by the activities of trawlers and factory ships from non-African countries just outside territorial waters.¹² One observer contends that the Soviet Union is aiming to apply great economic power by cornering the world's fish. He notes, however, that the Russians will remain the primary consumers and that, in view of their dependence on these resources, every effort will be made to guard against irrational depletion.¹³

It does not appear at this time that the Soviet fishing effort is directly engaged in expanding activities as a weapon of economic warfare. The fact that advanced Soviet fishery technology provides an advantage over others can hardly be criticized, but their exploitation of coastal fisheries which serve as the resource base of less-developed countries may be questioned.

Much has been written about the military value of the Soviet fishing fleet. It is probably true that the Russian trawler is the most versatile, if not the most valuable, ship on the high seas today from the viewpoint of Soviet security. Operating under the protective umbrella of international law, many of these ubiquitous ships are the eyes and

connecting data links to Soviet naval intelligence. They are also a constant reminder of Soviet presence. Aside from intelligence and communications roles, the Soviet fishing fleet, with its wide variety of ship types ranging up to whaling and factory ships of U.S. tender size, lends itself to almost every conceivable naval mission. In the main, the fishing vessels with their sea keeping qualities and configuration have obvious potential for mine warfare and ASW effort.

The utilization of fishing vessels for paranaval operations also provides experience and training and creates a close relationship between naval forces and the fishing fleet. Thus it is self-evident that the Soviet fishing fleet is an invaluable adjunct to Soviet naval forces.

In view of the foregoing, it is clear that the Soviet fishing industry is an effective Communist instrument of power and that an immense task is facing Russian fishermen as a consequence of policy so employing it. This power is manifested today by one of the world's largest and most modern fishing fleets, the use of flotilla operations and specialized fishing vessels, aggressive and complementary research programs, and worldwide operations. A most formidable combination!

Projection of U.S. Fisheries as an Instrument of National Policy. At this point it would be only natural to be fearful of the influence of the Soviet fishing industry. However, there is a redeeming factor: the United States has the industrial and technical elements of power to build the world's largest and most modern fishing fleet if needed. And as we know, there are still plenty of fish in the sea. How then would a strong U.S. fishing industry of comparable capability serve the interests of the United States?

Since the U.S. commitment to fight world hunger is now a major objective of foreign policy, it is appropriate to

look at the value of a strong fishing industry as an instrument of foreign aid—foreign aid being regarded as a principal instrument of our foreign policy.¹⁴

It is not suggested that the United States attempt to ship massive quantities of fish products to starving nations. This is an obvious impracticability even if the capability existed. The most efficient and economical means of distributing fish protein is in the form of fish protein concentrate (FPC). The United States has made substantial technical progress in processing FPC and is ahead of the Soviets in this field.¹⁵ The 89th Congress has passed legislation which would authorize the construction of one demonstration plant and the lease of another plant for such a program.¹⁶ The initial objective of the program is to provide sufficient quantities of FPC by 1971 to meet the protein needs of at least 1 million people.¹⁷ A long-range FPC program with necessary fishing vessels, processing plants, and related technical know-how exported by the United States and operated locally on a self-improvement basis has considerable merit.

In this regard, in a recent examination of the industrial and economic opportunities of the oceans, the most promising area in the biological field was considered to be in food processing. The analysis also predicted that some form of Marshall Plan to optimize the world's food resources was inevitable.¹⁸

A fishing industry is a good choice for the development of poor countries. In addition to providing food, it also stimulates the growth of subsidiary industries such as boatbuilding and repair facilities, processing and storage plants.¹⁹

H.E. Crowther, Director, U.S. Bureau of Commercial Fisheries, states that the potential yield in areas fished by the United States has been estimated as high as 10 times the present production of the U.S. fishing fleet. U.S. use of domes-

tie waters as a proving ground for world hunger is an alternate and perhaps more satisfactory initial approach to this problem.²⁰ In fact, this is probably the best approach for an early breakthrough in the FPC race with malnutrition.

Thus, in terms of foreign aid, a strong U.S. fishing industry would be an effective force in allaying world malnutrition, and U.S. material and technical assistance to fishing industries would provide the means for constructive development of less-developed nations.

The overall contribution of U.S. fisheries to the domestic economy has been discussed earlier. In comparison with other industries it is not impressive. Nevertheless, a competitive U.S. fishing industry could seriously affect the economies of large exporters, many of whom have received U.S. grants to improve their fisheries. However, with the growing demand for fish, markets for foreign products could presumably be found elsewhere if necessary. Ironically, the United States gave the Russians \$20 million worth of fishing vessels and equipment in World War II and was instrumental in developing their fishing fleet.²¹

The adverse effect of the importation of fish on the U.S. balance of payment problem deserves special mention. The total balance of payment deficiency in fishery has been estimated to be \$500 million.²² Continuing dependence upon imports without corresponding reduction in other areas will add to this imbalance.

The extent to which large imports weaken the economy of the United States is not addressed in this paper. A strong U.S. liberal trade policy has contributed to economic growth and to a higher standard of living. This policy is likely to continue.²³ Nevertheless, a fishing industry, capitalizing on the full potential of U.S. technology and operating with the same degree of support provided to foreign fleets by their gov-

ernments, is almost certain to be competitive in many types of fishing activity.

We have seen the paranaul value of the Soviet fishing fleet. Many of the same benefits would accrue to the United States.

The value of a Soviet intelligence-gathering trawler may not be fully appreciated until looked at from the standpoint of the *Pueblo* fiasco. Soviet intelligence gathering trawlers do not carry the sovereignty and prestige of their country on their sleeves as do the ships of the U.S. Navy performing identical missions. Now there is talk about giving intelligence-gathering ships of the United States improved protection.²⁴ Better to have an innocuous trawler apparently manned by civilians than to create international crises that embarrass national honor and jeopardize world peace under such circumstances.

There are now some 380 submarines in the Soviet Union of which 50 are nuclear powered. These submarines, distributed around the perimeter of the Soviet mainland and concentrated in the Arctic and Far East, are the main strength of the Soviet Navy.²⁵ It is not clear whether the United States has the means to counter this threat. There are indications that although present ASW capabilities will be adequate for some period into the seventies, they are leading toward a plateau of effectiveness, and they will be overshadowed by submarine effectiveness by the late seventies, unless improved.²⁶ The advent of the true submersible nuclear-powered submarine requires a different ASW doctrine than that of World War II. Very sophisticated defense and detection measures of global dimensions must be employed to cope with this threat.

Projecting a level of technology that is available today, the typical fishing vessel of the future will have sonar and TV equipment to search for and classify fish schools on the high seas—much the same equipment, knowledge, and skills

required to locate submarines. These ships will also have modern communications, navigation, and radar equipment needed for long-range operations. Moreover, studies have suggested that small, compact nuclear power plants for fishing vessels are not far away.²⁷ The use of a modern purse seiner as a link in a widespread ASW system may be justified even on a cost effectiveness basis.

During World War II about 250 fishing vessels were requisitioned and turned over to the Navy for use as minesweepers, patrol vessels, and gunboats.²⁸ Under the Fishing Improvement Act of 1964, the plans of fishing vessels that are built with Government assistance must be reviewed for defense features by the Navy Department. Although the defense requirements are very broad, specifications could be drawn up to meet specific defense needs. Thus, an expanded fishing fleet with military specifications would be of significant value during mobilization.

There are many other naval missions that can be performed by fishing vessels. The United States can no longer afford to ignore the advantages to be gained from the interaction of a strong fishing fleet and Navy.

It has been suggested that America's main role in fishing may be to export know-how and use domestic fishing as a proving ground to solve world hunger.²⁹ This opinion is generally consistent with the thoughts of this paper. However, a modern fishing fleet carrying a U.S. flag would represent a significant increase in defense strength at a nominal investment.

In conclusion, a strong U.S. fishing industry would be an effective instrument of foreign aid, would add leverage in projecting U.S. interests in international politics, and would increase U.S. defense effectiveness on the seas.

Epilog: Ocean Fisheries and International Stability. The value of the sea as a means of promoting international co-

operation appears to be almost universally accepted by serious writers on the subject. This optimism exists in the face of increasing competition among nations on the fishing grounds and a growing tendency to secure exclusive jurisdiction over what has traditionally been a common property resource.

Indeed, nations are finding ways to avoid conflict. For instance, to overcome restrictions in fishing off foreign coasts, the Japanese fishing industry has invested in joint ventures with other countries. About 25 joint ventures were in effect in 1965 in Central and South American countries and in Southeast Asia.³⁰ A joint American-Cameroon venture to develop a shrimp industry in the coastal waters of Cameroon has been undertaken along similar lines.³¹

As mentioned earlier, the Soviet Union has been very cooperative with other nations in matters relating to fisheries. Russian scientists and administrators participate actively in international agreements, conventions, and organizations concerned with research and regulation. The Soviet attitude in this regard is an important factor in maintaining order, developing cooperation, or otherwise influencing fishing nations.

The theme of the Second International Oceanographic Congress of the U.N. Educational Scientific and Cultural Organization (UNESCO), hosted by the Soviet Union, was "Research on the Ocean for the Good of Mankind." This effort has resulted in increased interchange of scientists and information between the United States and the Soviet Union.³²

The main thrust of the International Decade of Ocean Exploration proposed by President Johnson in May 1968 is to create international stability through joint ventures of many nations. The development of ocean fisheries is one of the major collaborative areas in this program.

Important international fisheries have been preserved for years through the actions of international commissions. For example, the International Convention for the Northwest Atlantic Fisheries, established almost 20 years ago, has 13 North American and European members, including the Soviet Union.³³ There are 14 fisheries commissions concerned with every form of marine life from shrimp to whales.

The United Nations is also involved in ocean fishery programs. The Food and Agriculture Organization (FAO) of the U.N. collects data, publishes fishery statistics, and administers far-reaching programs for the development of fisheries in underdeveloped countries.³⁴

The need for international rules for dealing with conservation of high seas fishery resources has been codified in the Convention on Fisheries and Conservation of Living Resources. This Convention has done much to provide precedents and standards for bilateral and multilateral agreements.³⁵

We have looked in on just a few of the efforts and developments that illustrate the positive relationship between fisheries and international cooperation. Of course there are other transactions, so to speak, that would appear on the other side of the ledger. But on balance the picture is favorable.

In a word, one of the great promises of the ocean fisheries, in addition to their future role in countering world hunger, is their potential value in exacting the cooperation of nations as a prerequisite for the full exploitation of their resources.

V--SUMMARY AND CONCLUSIONS

We have discussed many aspects of ocean fisheries. This final chapter will attempt to summarize some of the salient points of these discussions and to arrive at some brief conclusions as to their significance.

World hunger is a fact of life. Many programs have been initiated by the

developed countries of the world to combat this threat. All have failed if we count the growing number of hungry people still in the world. However, none of these campaigns have utilized the resources of the sea. Nations are now exploiting these resources, and a new dimension is being added to the world protein larder. Ocean fisheries can and will make a major contribution toward relieving the world hunger problem.

The United States has made a national commitment to combat world hunger through a food-from-the-sea program and has decided to revitalize its sick fishing industry to meet this commitment. Some progress has been made in this direction, but the results to date are only of token value. Despite Government support there is little promise that the fishing industry can compete with other enterprises in the investment world. Further, there is major inertia to overcome in the industry itself. It is concluded that the fishing industry in its present condition and with the Government assistance programs now in effect cannot and will not meet the policy objectives of the United States.

Under the concept of the Decade of Ocean Exploration, the United States has asked all nations to join together in an effort to assist underdeveloped nations and to combat malnutrition. Historically, programs of this type, though profound and stirring, rarely do what they are supposed to do. If this program is to succeed, the United States must take the dominant role toward its implementation. Furthermore, such action is probably the only means of stimulating the development of a viable U.S. fishing industry.

The world fishing effort is expanding at such a rapid rate there is much concern over the depletion of fishery resources. Although the estimates of the potential yield of ocean fisheries vary widely, there is every indication that there are sufficient fish in the sea to sustain man's most ambitious fishing

efforts. Yet, to gain the most benefit from these fish, they must be reduced to a more durable and economical form such as fish protein concentrate (FPC). The future success in meeting the nutritional needs of the underdeveloped nations will be largely through the use of FPC.

Nations fish mainly for money and food. Nevertheless, there are other benefits. Several Third World nations have discovered that possession of fertile fishing grounds or a high-performance fishing fleet will also give them international attention and prestige and with reasonable investment. The bonus of power and prestige will serve on an extra incentive for these nations to develop or strengthen a national fishing program.

Science and technology are the companions of a modern fishing industry. Substantial progress is being made in fishery oceanography. Yet, the fishing process today, a game between hunter and quarry, is a generation behind in technology. In the final analysis, a technological contest over fisheries would be between the United States and the U.S.S.R. The U.S.S.R. is ahead and is likely to remain ahead in this department barring a spectacular challenge by the United States.

The Soviet Union fishing program is a deliberate tool for advancing national interests, and their fishing fleet is the largest and most modern of all nations. The Soviets, capitalizing on the common property resources of the oceans, have made rapid and important economic, political, and military gains and will continue in this direction.

The United States has not elected to follow this route in the economic race with the Soviet Union. In fact, over the past two decades the fishing industry, allowed to fend for itself, has been relegated to the position of a minor industry. There is now a gradual awakening to the importance of this option. It is unlikely that any momen-

tous change will take place in the economy as a result of a change; the typical U.S. citizen simply does not have a hunger problem. Nevertheless, as we look back on the serious food trouble the underdeveloped world is experiencing, a strong fishing industry has great promise as an instrument of foreign aid.

The Soviet Union operates trawlers openly. The United States should have no compunction about employing fishing vessels for the same purpose. Furthermore, the United States can no longer afford to ignore the importance of modern fishing ships as an adjunct to its naval forces. In short, ocean fisheries offer the United States a means to regain the initiative in international affairs that has been forfeited to the Soviet Union.

There is increasing opportunity for conflict on the fishing grounds, and much more is at stake than before. The organizations and means created for international understanding and regulation of fisheries will also be harder pressed than ever before. Many small nations, attempting to reconcile these problems by extending their sovereignty onto the high seas, are adding to the problem. Fortunately, many others,

BIOGRAPHIC SUMMARY



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including the Soviet Union, advocate an open-sea policy and are pursuing a course for the rational and shared use of ocean resources. Ocean fisheries will always be a source of conflict. On the other hand, by their very nature, they

provide a means for nations to negotiate and settle their differences on a common ground. In this regard, ocean fisheries serve their most important role: that of national instruments for international stability.

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Whosoever commands the sea commands the trade; whosoever commands the trade of the world commands the riches of the world, and consequently the world itself.

Sir Walter Raleigh: Historie of World, 1616