

RESEARCH
DEVELOPMENT
SERVICE
TRIDENT

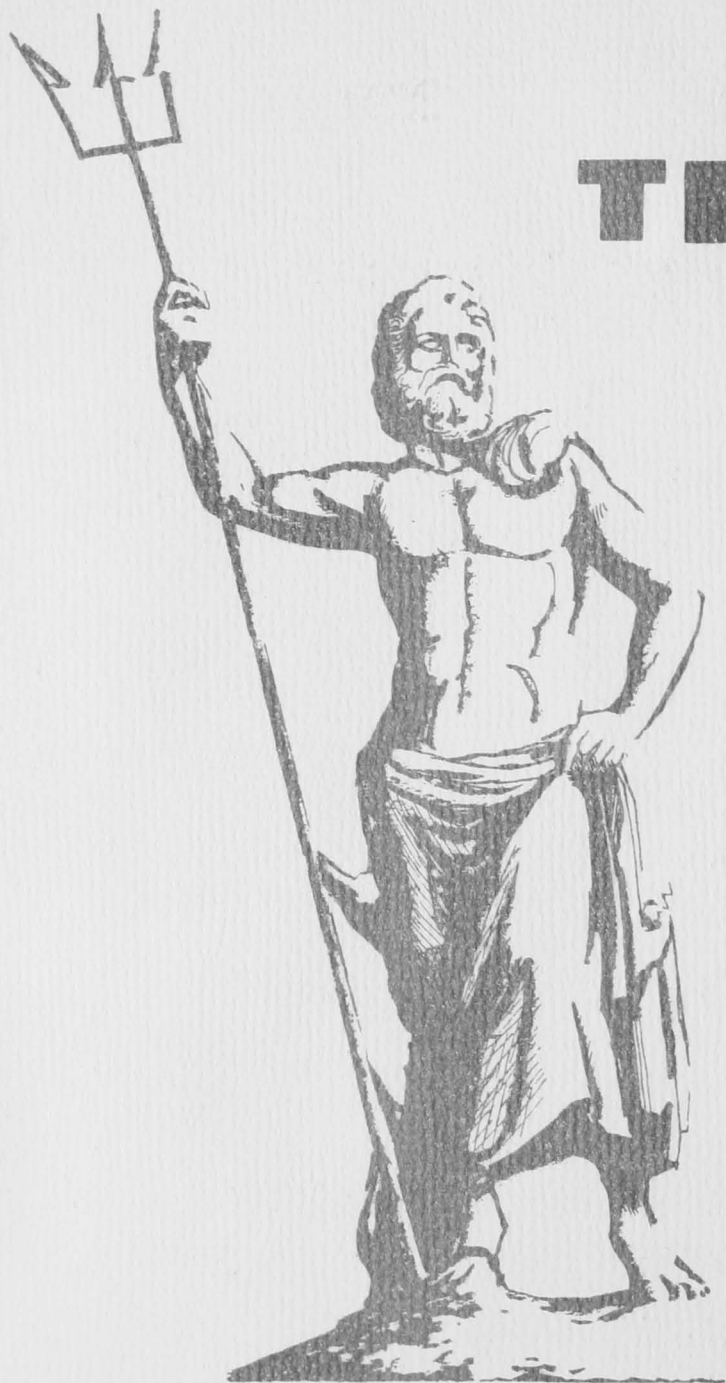
**A LONG RANGE
REPORT OF THE
BUREAU OF
COMMERCIAL
FISHERIES**

U. S. DEPARTMENT OF THE INTERIOR
BUREAU OF COMMERCIAL FISHERIES



Cur 149

TRIDENT



When the universe was divided, according to legend, **NEPTUNE** received the oceans as his domain. Neptune and his **TRIDENT**, or three-pronged fishing fork, have since become symbolic of all the waters of the earth. We feel therefore that **TRIDENT** is a fitting name for the **LONG RANGE REPORT** of the **BUREAU of COMMERCIAL FISHERIES**. For its plan, like Neptune's Trident, is three-pronged, encompassing **RESEARCH . . . DEVELOPMENT . . .** and **SERVICES**.

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TRIDENT

A LONG RANGE REPORT OF THE BUREAU OF COMMERCIAL FISHERIES



CIRCULAR 149
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PREFACE

The United States, for generations a leader among the fishing nations of the world, has during recent years slipped from second place to fifth in the harvest of the resources of the sea. Not only do Japan, Russia, and Red China now catch more fish than the United States, but so does Peru, a relative newcomer to the world fisheries scene.

Fishing has been an important activity in this country for nearly three and a half centuries. From the time in the early 1600's when the first colonists fled England for America in the tiny, sail-powered Mayflower to the present day, fishing--first for food and later for both food and industrial products--has been a traditional American occupation, and the industry based upon this way of life has over the years made significant contributions to the Nation's health and economy.

But times are changing, and while the commercial fishing industry in the United States is still a billion-dollar-a-year business, it faces serious problems on many fronts. Markets are being lost to imports, some ocean resources historically fished only by Americans are being exploited by other nations, and the industry, with a few exceptions, is failing to keep pace technologically with its competitors.

The United States cannot afford a continuing decline in its commercial fishing industry. More than half a million people depend on this industry for their livelihood. It supplies over a million tons of food each year for our population, and in a variety that can be matched by no other protein-rich commodity. The industry contributes substantially to the Nation's transportation system. It helps to keep the shipyards busy, is important to container and packaging manufacturers, and provides this country with a reserve of trained mariners in the event of a national emergency. Beyond this, the oceans of the world are a vast storehouse of renewable food and industrial resources that can contribute substantially to the diets and economies not only of our own people but also to those of the rest of the world. With our own population expected to increase by nearly 75 million in the next 20 years, the time may soon be at hand when the United States will have to look to the sea for more of its food supply.

President Kennedy emphasized this point when he said that "the sea around us represents one of our most important but least understood and almost wholly underdeveloped areas for extending our resource base . . . salt and fresh water fisheries are among our most important but far from fully developed reservoirs of protein foods."

Development of these reservoirs referred to by the President will require a vigorous, three-pronged program of research, development, and services. This report, Trident, outlines such a plan with the essential components--research, development, and services--being symbolized by the prongs on Neptune's fishing spear.

To remain in competition for the world's fishery resources the U.S. commercial fishing industry must be revitalized and made more productive and profitable. It must be quick to utilize technological advances and it must use available knowledge regarding maximum sustainable yield of the resources fished, both now and in the future. Exploratory work must be done to first delineate, then find economic ways to fully utilize presently underutilized or nonutilized fisheries available to our fishermen.

Assuming that these things must be done, what then is the role of the Bureau of Commercial Fisheries, within the framework of Department of the Interior policies, in seeking a solution to this problem?

This report assumes that the primary task of Government is to develop the basic knowledge about the fishery resources and their environment. Such knowledge will provide background information for industry to use in determining where to fish, what to fish, and how much to fish. Included in this knowledge will be basic facts relating to the size and nature of the resources, methods for their economic harvesting, development of new processes and products, and the assessment of domestic and/or world market potential for those new or more abundantly available fish or fishery products.

The Bureau believes the proposals set forth in this report represent a balanced program of research, development, and services aimed towards this end. The report calls for development of regional programs throughout the land commensurate with the value and potential of the fishing industry and the seriousness of fishery problems involved, with appropriate attention to resource discovery, resource protection, and resource use. The schedule calls for more research and services, more people to carry these out, more equipment, and new and better physical facilities. To accomplish this, the plan calls for a greater expenditure of money than is now appropriated to the Bureau of Commercial Fisheries.

The Bureau has considered the need for specialists to fulfill the stated objectives and has recommended a positive personnel program to provide proper recruitment, training, and retention of necessary specialized personnel. The plan is based upon the realization that the Bureau of Commercial Fisheries must achieve a position of leadership in supplying knowledge, through research, development, and services, for conservation and full economic use of commercial fishery resources. It is the Bureau's responsibility to recommend to the Department of the Interior a program that will eventually lead to creation and maintenance of a strong and prosperous commercial fishing industry and help assure an ample supply of high quality fishery products for the American consumer. The elements of the plan presented herewith provide for these objectives.

This report should not be regarded as an inflexible projection. It is to be constantly reviewed and revised as conditions dictate. Research findings of tomorrow may well render obsolete the planning of today. The ever-changing world in which we live will have influences, some fleeting, some permanent, on the direction of our program.

This report is the Bureau's estimate, based on the best information at hand, of where it should be in 10 years and how it should get there. Congress, of course, will play an important role in the implementation of certain facets of this plan. New authorities and appropriations, such as those for a liberalized fishing vessel construction subsidy program, will be requested from time to time as the need arises.

SUMMARY

Trident, the long range report of the Bureau of Commercial Fisheries, has two broad objectives: (1) To strengthen the industry and (2) to conserve the resource. These objectives will be attained through a vigorous application of the detailed three-pronged plan of research, development, and services outlined in the body of this report.

Trident is divided into two sections, each with a specific purpose but at the same time complementary in implementing the overall program and in reaching its ultimate goal.

The first section of this report is ACTION NOW, a 13-point plan to deal immediately with the urgent problems of the industry. It is in this section that solutions, strongly stressing the development and services aspect of Trident, are proposed for problems which demand attention now and which will require continuing attention as the long range plan is fully implemented.

The second section of Trident, THE LONG HAUL, attacks, primarily through research, the basic, deep-rooted problems of the industry and of the resources. The impact of THE LONG HAUL will be felt more gradually than that of the ACTION NOW program, but both approaches, necessary immediate action and long-term research, are essential to achieve the Bureau's long range objectives.

In the opening section of this report the Bureau proposes immediate and positive action as follows:

- That the fishing industry be provided with assistance comparable to that provided by the Government generally.
- That the tariff structure for fishery products be thoroughly reexamined and that modifications be proposed for any disparities that may be found in the classification of duties.
- That methods be developed to offset subsidies paid by foreign countries to producers who export fishery products to the United States.
- That a broader and more realistic fishing vessel construction subsidy law be enacted.
- That more emphasis be placed on the development of bilateral and multilateral international agreements in the management of high seas fishery resources.
- That more meetings be held and more information exchanged between the U.S. industry and foreign fisheries having common problems.
- That the Government increase its efforts to develop and expand foreign markets for exportable fishery products.
- That provision be made to obtain more adequate information on fishery developments and markets in key foreign areas.
- That technical findings be more quickly disseminated and that the industry be more aggressive in the adoption of new developments and findings.

--That industry-Government efforts to develop quality standards for fishery products be accelerated.

--That joint market promotional and advertising campaigns by U.S. and foreign producers be encouraged to stimulate the consumption of fishery products throughout the world.

--That concerted action be taken to stimulate the development of research scientists to meet rapidly expanding research needs.

--That aggressive safety programs be expanded to decrease alarmingly high fishing vessel hull and protection and indemnity insurance, and thus reduce operating costs.

In THE LONG HAUL plans are outlined that detail the searching, time consuming efforts that eventually will fill the many gaps in knowledge of living resources of the sea and their environment. Insufficient knowledge hampers our conservation of these resources and handicaps their full utilization. New methods of finding and catching fish, as well as handling, preserving, and transporting the catch, are needed. Impairment of natural habitat by man's activities has severely injured important inshore fisheries and needs more intensive study.

Some problems of the fishing industry are countrywide; others are regional in nature and require individual attention. Because local problems require first-hand knowledge of local conditions, detailed planning will be done at the regional level. Special attention must be given to such difficult problems as Japanese and Russian fishing pressure in the North Pacific; effects of foreign competition on U.S. fisheries for tuna off California and Latin America, for shrimp in the Gulf of Mexico and South Atlantic coasts, and for groundfish in New England. Solution to the problems of manmade changes in the environment such as effects of dams on anadromous fish, dredging, and other environmental changes on fish and shellfish must be found. The ravages of pests and diseases on shellfish on all coasts, and fluctuations in abundance of shrimp in the Gulf of Mexico are examples of serious problems that threaten various segments of the fisheries. Foreign materials such as pesticides and other chemicals are polluting the natural waters. These problems are urgent and results must be attained quickly if the natural waters are to be maintained for fish production.

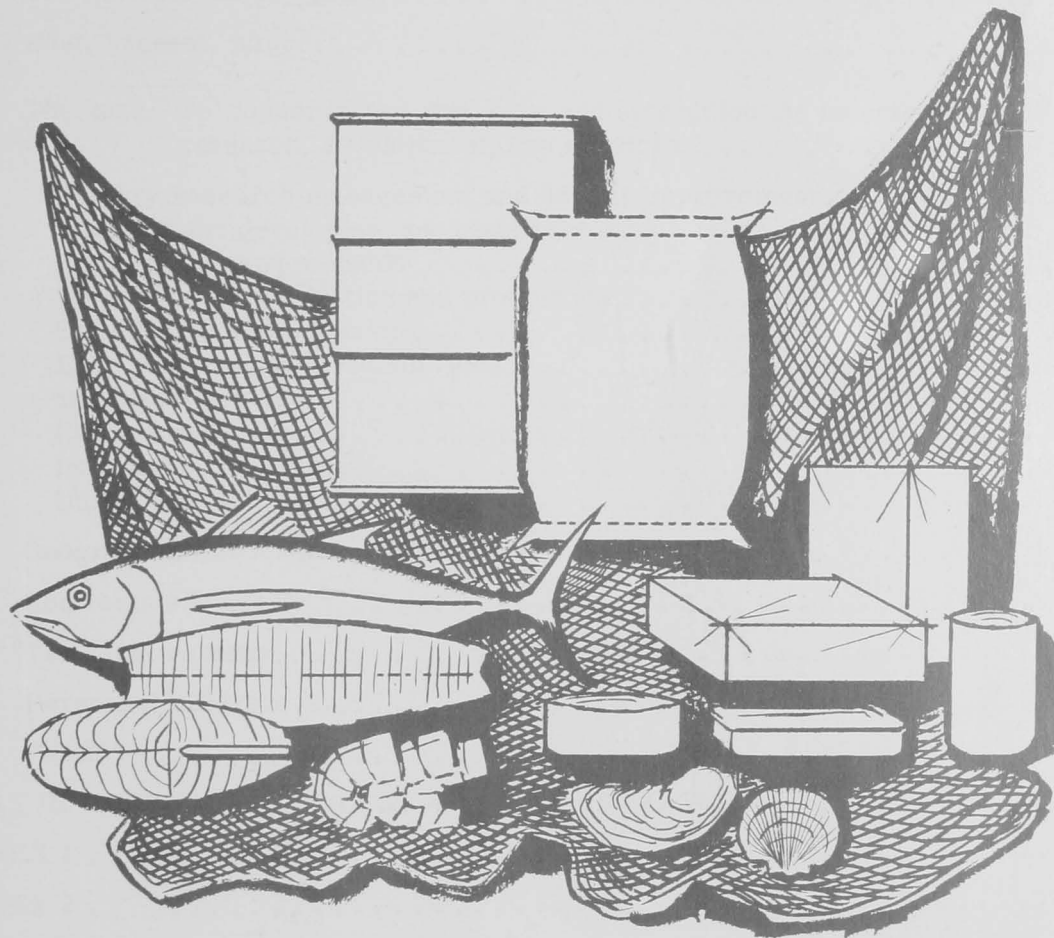
An important aspect of long range planning is participation by the Bureau in the National Oceanography Program. This program, strongly endorsed by the Department and the Administration, and supported by the Congress, is now moving at an accelerated pace. The Bureau is cooperating with other Federal agencies, through the Interagency Committee on Oceanography, and is assuming its full share of responsibility for planning and investigation. One of the first requirements in this program and in the proper staffing of current Bureau activities is the training of scientists of high caliber. Another is the provision of adequate laboratories and ships. As these programs provide the necessary scientific personnel and facilities, the Bureau's oceanographic research can grow at a greater rate. This will provide the proper balance between basic research and research directed at certain specific problems of the fisheries.

In addition to the Bureau's programs designed to assist the domestic fishing industry, which of course will benefit the consumer indirectly, acceleration is planned for research and service programs designed more specifically to benefit the American consumer.

Bureau scientists will intensify studies on the composition of fishery products to provide data for use by dietitians, physicians, and homemakers in developing properly balanced diets. These studies will concentrate on such essential food components as amino acids, minerals, fats, and vitamins.

Through research new methods for improving the handling of raw materials and developing better preservation techniques, including freeze drying and irradiation pasteurization, will be sought. The development of standards of grade for the principal fishery products will be expanded, and the Bureau's voluntary inspection service, which utilizes these standards, will be continued to assure the housewife of certified quality through the use of Department of the Interior quality grade labels.

The Bureau believes the goals of this report are consistent with, and will contribute to, the Department of the Interior's balanced program of conservation and wise use of natural resources. It further believes that many of the plans outlined here will be of benefit to the ever-growing marine sport fishery and will complement the programs of the Bureau of Sport Fisheries and Wildlife and the Bureau of Outdoor Recreation.



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FISH AND SHELLFISH

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INTRODUCTION

Long Ago

The fisheries of America have played a unique part in this country's economy since its founding. John Cabot, returning to England in 1498 from North America, stated that "the sea there is swarming with fish which can be taken not only with the net, but in baskets let down with a stone." Historians record that the founders of the Plymouth Colony came to America to serve God and to catch fish.

In Peace and War

The colorful New Bedford and Nantucket whaling fleets ranging the oceans of the world in the 19th century were a large factor in forming the bonds which eventually joined Hawaii to the United States. The great salmon fisheries have been a principal support of Alaska through the years and have been a greater source of wealth than all the gold produced there since the Alaska gold rushes began. During World War II, the spectacular tuna clipper fleet furnished the ships and the men which maintained contact with our beleaguered troops during their initial days of perilously slight foothold on the Solomon Islands, and these same fishing boats helped supply small island garrisons throughout the vast reaches of the Pacific during the entire war. U.S. trawlers and purse seiners also went to war as minesweepers and patrol vessels.

An Asset Today

In addition to these colorful episodes of the past, the fisheries were, and still are, of major economic importance to many sections of the United States. When allied industries servicing and selling fishery products are considered, the contribution of these resources to the Nation's economy is substantial. The 5 billion pound per year fish catch itself, when processed, is worth well over a billion dollars annually at the retail level. Employment, direct and indirect, is furnished to more than half a million persons.

The recreational use of our fishery resources is showing phenomenal growth; and large industries, such as sport fishing gear manufacturers, party-boat operators, and others, are supported by the more than 20 million Americans who fish for sport each year.

Our aquatic resources are far more valuable than is indicated by the number of persons they support or the dollar value of their products:

1. They are living, renewable resources that can continue to make their contribution to our welfare forever if we treat them wisely.
2. They enrich our diet with variety. Counting only those items abundant and popular enough to be found on every grocery shelf or in every frozen food case, there are a dozen staple main dish items; and if the less usual is sought, the list expands into hundreds of products.

3. They promote health, providing dietary supplements such as vitamins, trace minerals, and other essential requirements in wider variety than any other class of foods.

4. They have, because of the properties of their protein and oils, potential uses as pharmaceuticals and industrial chemicals which are only beginning to be realized.

5. They develop the seafaring qualities of our people and provide marine facilities and equipment that may be needed in times of emergency.

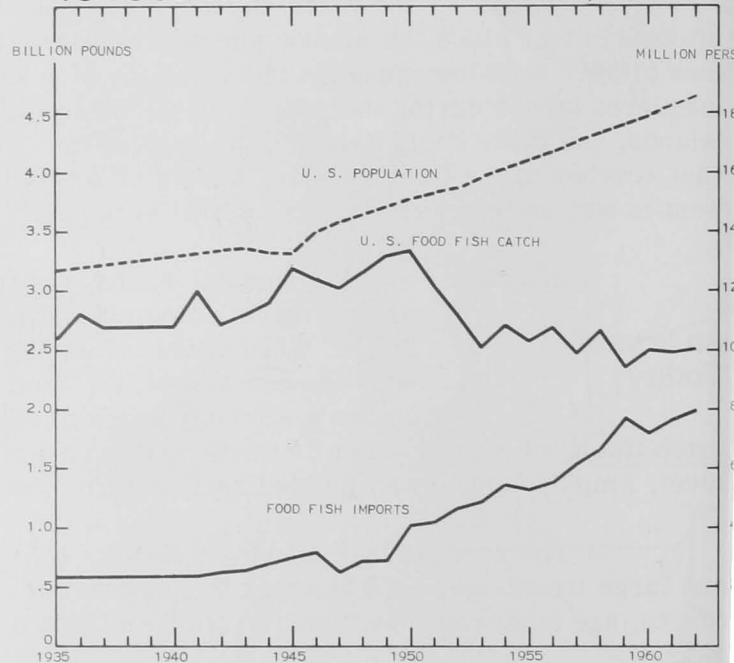
THE CHANGING WORLD

The Food Fish Industry

For years this valuable resource, and the industry based on it, have been taken too much for granted; now the nation finds itself faced with an increasingly serious crisis. Postwar economic, political, and social problems and century-long trends in resource utilization have combined to impose upon the fishing industry pressures almost too strong for it to bear. While much of the economy is enjoying unprecedented prosperity, with national income at an alltime high, and with a growing population creating an even larger market and greater consumption of fishery products, the domestic food fish industry is shrinking. Basically, this shrinkage has resulted from many factors: Unwise use or fluctuations of the resources; increased production costs; competition from other animal protein foods and from high-quality products abroad; increased competition for the resources of the sea by the nations of the world; and a lack of knowledge of the sea, of the biology of its resources, and of the relationships between them. Until 1950 the catch of food fish generally paralleled our population growth. During the period from 1950 to 1962, production of food fish dropped 24 percent while the population increased about 23 percent. In the same period imports of food fish have grown over 100 percent. Americans are not eating less fish--but more of what they eat is coming from foreign sources.

with an increasingly serious

RELATIONSHIP OF UNITED STATES POPULATION TO FOOD FISH CATCH AND IMPORTS, 1935-62



While this has been happening to the catch of food fish the catch of industrial fish used for animal feed supplements for oil and other industrial uses for pet food and for bait has grown enough to keep the total catch on the upgrade. In 1962 the industrial fish catch was 70 percent greater than in 1950. Imports of industrial fish products have increased also. In recent years imports of these products have represented the equivalent of 25 to 55 percent of the domestic supply of industrial fish. The demand must be kept high if American markets are to absorb the industry's increasing catch and the rapid increase in imported industrial fish products.

Industrial Fish

U.S. Market: The World's Best

Looking at the fisheries as a whole it can be seen that whereas the domestic fisheries supplied about 80 percent of the market for both edible and inedible products in the years from 1947 to 1950, they supplied only 53 percent in 1962. In Annex I comparative data is given on the trends in some of the leading fisheries as well as in the whole industry. It is evident that the burden has not fallen evenly upon all of the fisheries. Many of the major fisheries are facing serious difficulties, but the New England trawl fishery, shrimp fisheries of the South Atlantic and the Gulf of Mexico, and the tuna fishery, in particular, can be regarded as examples of the periodic problems which American fisheries face in the changing world of today.

Major Fisheries in Trouble

The oldest, and still one of the most important fisheries, is the New England fishery operating from Boston and other New England ports. It produces most of the domestic supply of packaged frozen fish, such as haddock, ocean perch, and flounder fillets. Between 1949 and 1961 the Massachusetts trawler fleet shrank 40 percent; its catch, 30 percent.

Foreign Competition

U.S. policy in the postwar years has encouraged the development of trade including the trade in fishery products. This country's growing markets for frozen and canned fish, coupled with the high standard of living and prices, have stimulated fishing countries around the world to export fishery products to the United States. Tuna from Japan and Peru; shrimp from Mexico, Panama, and about 40 other countries; fish meal and oil from Peru, Angola, and Canada; and groundfish blocks and fillets from Canada, Iceland, Norway, Denmark, and West Germany are but a few examples.

Shrinking Markets for American Fish

The New England trawler fleet is shrinking. Attrition is taking place in this trawl fishery for several reasons. The ocean perch fishery resource near the New England shore has been depleted. More and more effort is required by fishermen to harvest this slow growing species. Fishermen are forced to go farther and farther from port to secure payload quantities. Exploitation of this resource has become less and less profitable during recent years and consequently annual landings are in a pronounced downtrend. Paralleling the decline in redfish landings has been an increase in the quantity of groundfish imported by New England processors from Canada and, to a smaller extent, from other countries which traditionally fish the North Atlantic. Another reason for the decline of the number of vessels in the New England trawl fishery has been the high cost of maintaining and replacing those vessels. Vessel construction costs in the United States are much higher than abroad. Even with substantial Government subsidies, American fishermen feel that they cannot profitably compete with imports from other countries. In general, earnings of the New England trawler fishery have not been

sufficiently high and competitive with other industries to attract young men. Consequently, a major share of the American market for groundfish has been lost. Domestic fishermen retained only about one-third of the market for groundfish fillets in 1961.

U.S. Markets Attractive to Other Nations

How has this come about? Looking at the surface it is easy to see how. The new technology of freezing, developed largely in the fishing industry, has made such fishery products as haddock fillets, tuna, and shrimp international commodities. They ship easily and efficiently by present-day packaging methods and fit well into present trends of frozen food merchandising. The American market is very attractive, especially to countries depending heavily on fishery resources, and the American tariff structure provides few trade barriers.

The Struggle for Markets

The U.S. fishing industry has not been passive. It has made many of its products more attractive to the American housewife. In some areas, operations at sea and ashore are more efficient. In fact, the American industry has competed for its share of the American market so intensely, and with such effect, that some competitors abroad can no longer rely on their intrinsically lower costs of production but have had to invoke substantial aid from their governments. It is always difficult to arrive at the amount of government aid in meaningful terms. But taking only the more direct and obvious elements such as subsidies for salt, bait, bait storage, vessel construction, and price supports into account, one country, as an illustration, has provided an annual subsidy in recent years of about 1 cent per pound, an amount equal to the margin of profit for many species at the processing level. Such differentials play an important part in gaining access to American markets.

Government Aid for Re- search, De- velopment, and Services

While helping itself as much as possible in the direct economic sphere, the U.S. fishing industry has also sought to strengthen its position in other quarters. It has sought Governmental recognition of its needs through legislation. The first step was taken by passage of the Saltonstall-Kennedy Act in 1954, and a larger, more decisive step, passage of the comprehensive Fish and Wildlife Act of 1956, followed. The first made a portion of the customs receipts from imported aquatic products available for Governmental research, development, and services. The second freed these moneys from certain limitations; set up a loan fund to help vessel owners; and strengthened the arm of the Government's fishery service by a reorganization, by a declaration of national fishery policy, and by a clear authorization of functions intended to afford opportunity and assistance to the fishing industry more nearly equal to those available to American industry generally. Vessel mortgage insurance and construction differential subsidy programs also have been authorized and are in operation.

Short Range and Long Range Programs

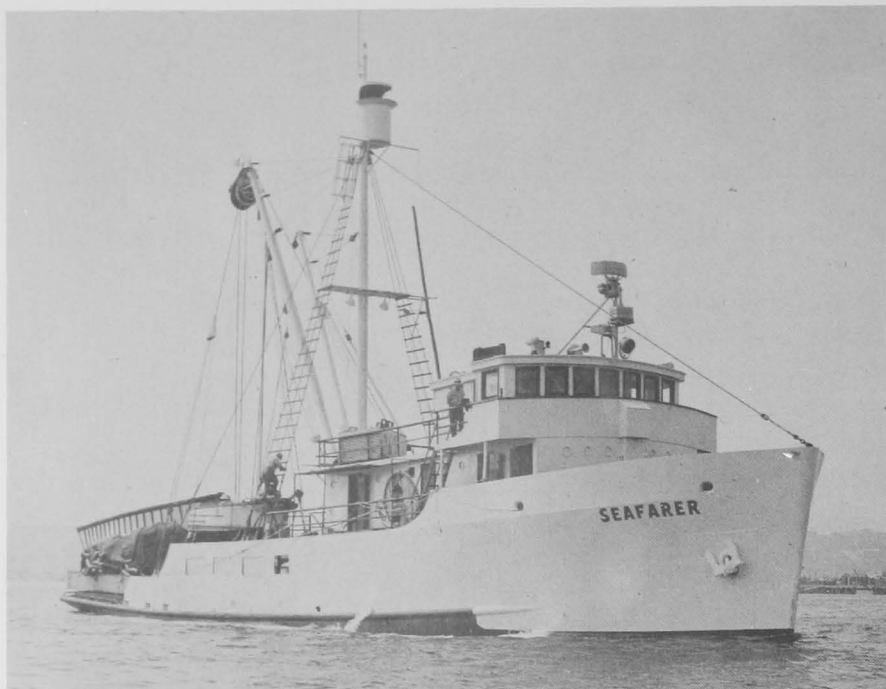
The broad intent of the policy is to strengthen the industry and to conserve the resource through research, development, and services. To strengthen the industry requires recognition of the factors seen in a first quick look. To conserve the resource, while keeping the industry strong, requires a longer, deeper, and more searching examination. The first look suggests that immediate, urgent steps are needed to prevent the industry's position from deteriorating further. These constitute a short range program. The second look searches for the trends which have led to this present crisis, and for the solutions needed to reverse the trend as we look toward the future. This points to a long range plan with which most of the report is concerned.



Many New England trawlers are tied up and rusting at the dock while the markets for domestically caught fish have shrunk.



Russian mothership and gill netter on Georges Bank. Incursion of Soviet fishing fleet into traditional American grounds is of great concern to the industry and the Bureau.



Many Pacific coast tuna clippers recently have been converted to purse seining with increased efficiency. Private capital and Government financing have each been instrumental in aiding modernization of the tropical tuna fishery.



The Bureau has set quality standards for fishery commodities, which help enable the housewife to get what she pays for. A voluntary inspection service of the Bureau helps insure that standards are complied with and labels are correct.

PART I - ACTION NOW

Short Range Planning

The following short range plan is designed to improve the competitive position of the U.S. fishing industry to meet the growing demand for fishery products throughout the world. In recent years it has not been able to do this, especially for edible fishery products.

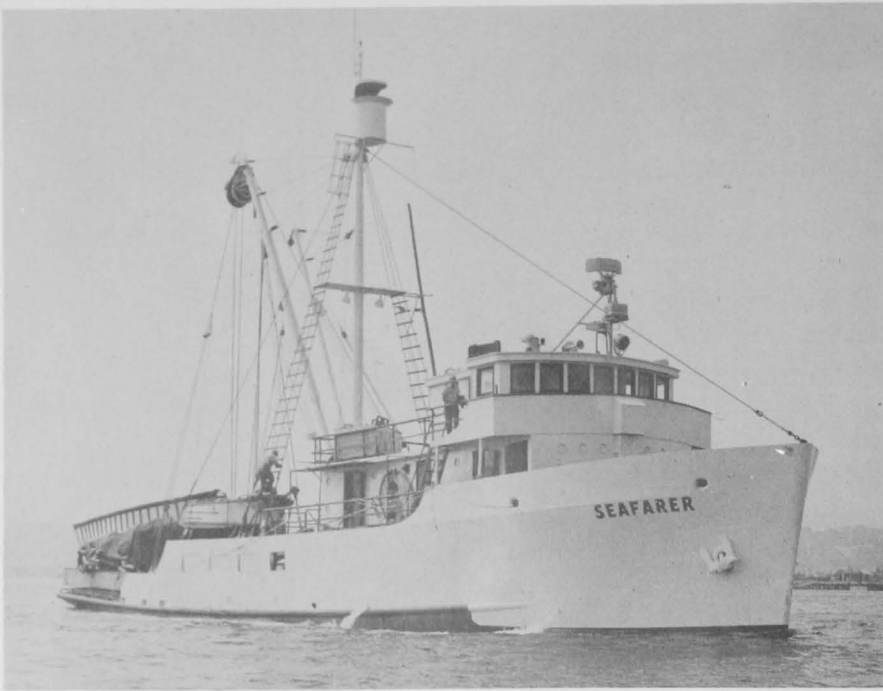
This short range plan is not intended as a solution to the deep rooted, basic problems that are associated with the conservation of resources and the harvesting, processing, and marketing of fishery products. These problems and the Bureau's long range plan designed to solve them are discussed in Part II - The Long Haul.

The Goal

The Bureau believes its short range goal should be to strengthen the ability of the fishing industry sufficiently to improve its competitive position and to increase its share of an expanding world market.

To reach this goal we recommend:

1. That, consistent with the public interest and in accord with the industry's justifiable needs, continued efforts be made to provide the fishing industry with assistance comparable to that provided by the Government for industry generally.
2. That in tariff negotiations under the Trade Expansion Act, the relatively low level of U.S. fishery duties be given appropriate consideration; and that the present domestic tariff structure for fishery products be thoroughly studied with a view toward possible modifications to correct disparities which may be found to exist in the classification of duties.
3. That a workable method be developed to offset possible adverse effects of subsidies by foreign countries to producers who export fishery products to the United States.
4. That Public Law 86-516--fishing vessel construction subsidy--which was enacted to reduce the cost of acquiring domestically built fishing vessels--be extended and amended to be of more substantial aid to the fishing industry generally.
5. That the Bureau continue to work toward development of equitable bilateral and multilateral international agreements based upon scientific evidence and conservation principles to resolve existing controversies. Such problems arise from the activities of the fishermen who fish in areas of the high seas close to the coasts of other countries, or who harvest stocks of fish jointly with fishermen of other countries. Some of these responsibilities are being discharged under existing conventions concerning salmon, halibut, tuna, and fur seals in the Pacific; groundfishes in the Atlantic; fisheries of the Great Lakes; and whales in all oceans. Other international agreements may be necessary as circumstances warrant.



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6. That when problems involving similar segments of U.S. and foreign fisheries exist, meetings to exchange information be encouraged.
7. That the Government increase its efforts to develop and expand foreign markets for exportable fishery products.
8. That provision be made to obtain more adequate information on fishery developments and markets in key foreign areas.
9. That the results of new technical findings which hold promise of increasing both the production and processing efficiency of the U.S. fishing industry and improving the quality of the product be disseminated promptly, and, in turn, that the industry take measures to insure early application of new developments and findings.
10. That industry-Government efforts to develop quality standards be accelerated.
11. That joint market promotional and advertising campaigns by U.S. and foreign producers be encouraged to stimulate consumption of fishery products in the United States and in foreign countries.
12. That the Bureau, in cooperation with universities, professional societies, research institutions, and other public and private agencies, take expanded action to stimulate the development of competent research scientists in the fields of biological and physical oceanography in numbers to meet the rapidly expanding research needs.
13. That aggressive safety programs be continued to decrease alarmingly high fishing vessel hull and protection and indemnity insurance so as to reduce operating costs.

This brief listing does not tell the whole story. Details of these 13 steps follow:

Acceptable Assistance The U.S. fishing industry has long resisted direct subsidization or price supports, believing that production controls would inevitably follow. The Bureau does not suggest this particular type of financial aid. But to save a number of important segments of the fishing industry, various types of assistance that are consistent with the public interest may be necessary until long-term solutions can take effect. Those types of assistance which are generally accepted and have proved helpful to other industries should be examined for their applicability to the fishing industry. Equalizing the cost of vessel construction with that of other nations is an example of such assistance.

Tariffs In 1950 the Department of the Interior became a member of the Interdepartmental Committee on Trade Agreements and, later, the Trade Policy Committee, the groups which advise the President on trade policy matters. In earlier years many of the duties on dutiable fishery products had been reduced by 50 to 75 percent from base schedules of 1930.

Tariffs offer only a minimum of protection to domestic fishery products. In 1961 the average duty on all fishery imports, in terms of the ad valorem equivalent on value, was 42 percent less than the similar duty on all imports. About 43 percent of the imports of edible fishery products, for example, were dutiable in 1961, at rates reduced by trade agreements. About 18 percent were completely free of duty and bound against increase. Another 27 percent were also free of duty, but not bound. Of the remainder, only about 11 percent were duty-bound at the full rate, and only 1 percent was dutiable and not subject to trade agreement concessions.

Our tariff structure for fishery products is based upon trade patterns of the 1930's and needs to be studied in relation to present trade patterns which are substantially different from those existing when the Tariff Act of 1930 was enacted. While a number of changes in tariff policy have occurred since 1930, they have not kept pace with economic and technological changes that have altered the effectiveness of established duties. For example, during this period many new fishery products, such as fish blocks and tuna loins and disks, have entered international trade. Since these products were not provided for in the original tariff classification, they were necessarily fitted into the classification category that appeared to be the most appropriate. The result is that many fishery products have been classified at rates which appear unrelated to the relative value of the product.

A study of the current tariff structure should be made to provide for modifications where necessary and to remedy disparities in classifications and duties, all within the administration's policy to reduce tariffs and stimulate trade.

Many imported fishery products with which the domestic industry must compete are produced at lower costs. In addition, many countries provide financial assistance in the form of subsidization, loans, and other aids. These factors make it difficult for the domestic industry to compete effectively with some imported fishery products, and avenues should be explored to attempt to alleviate this situation.

Competition From Foreign Subsidized Products

U.S. high seas fishermen have had to compete with foreign fishermen working vessels built at far lower costs because American fishermen are precluded by law from building abroad. Estimates of the disadvantage run as high as 50 percent of the cost of vessel construction. A similar situation was long ago recognized and is now largely rectified in the Merchant Marine fleet, where new building for some years has been aided substantially by the Government. On June 12, 1960, Congress eased this disparity by enacting Public Law 86-516. However, under the terms of this new Act, only those segments of the industry which are found to be injured or threatened with injury by reason of increased imports are eligible for the construction subsidy. Also, the subsidy is payable for a period of 3 years only. This program should be continued and expanded to include more segments of the fishing industry and to increase the proportionate amount of the subsidy.

Aid to Offset Foreign Low- Cost Vessels

Help with shipbuilding will tend to equalize competition with foreign fishing vessels, but it does not touch the problems of the higher costs of operation in this country (costs which incidentally are made higher by assistance to other American industry, such as price-supported cotton which goes into fishing nets), and U.S. technical and financial aid to foreign fishing operations.

Conflicts Over Fishing Rights

Today a number of important fisheries depend upon stocks of fish found at one time or another in the high seas close to the coasts of foreign countries, or upon stocks of fish that are also harvested by foreign fishermen. The resulting competition for these resources leads to conflicts over fishing rights, frictions, and dislocations of fishing practices which increase costs and in the end threaten U.S. fishermen with loss of access to these resources. Today these conflicts are serious for some segments of the industry. In the long run, with an expanding industry, their effects will be more broadly felt. The Bureau must increase its efforts to find bases for bilateral or multilateral agreements which will solve current problems in a manner which is both equitable and sound and will provide a means for dealing with similar problems in the future. A better understanding of the economic, political, and biological factors involved, both domestic and foreign, will be necessary. A basis which takes these factors fully into account will provide enduring solutions. An immediate step is to improve substantially means for obtaining information that will bring about this improved understanding.

International Meetings

In certain instances the critical problems faced by the domestic fishing industry of the United States are common to those of the fishing industries in one or more other countries. In such cases an exchange of information will go far toward solving these problems to the advantage of all countries involved. When it appears that such conditions exist, meetings should be encouraged, subject, of course, to the national interest.

Foreign Markets for Domestic Products

In contrast to the large, growing volume of imports, relatively few fishery items are exported from the United States to foreign markets. However, some domestic producers of these items depend extensively upon foreign sales. With the economic position of many foreign countries improving, an opportunity exists to regain lost markets and develop new ones. A foreign marketing program would extend to the fishing industry the type of foreign marketing assistance that has proven so beneficial to domestic agriculture. Without early assistance of this type, even further foreign market losses may be suffered by domestic fisheries which largely depend upon the export market for their survival.

Fishery Attaches

Each year technical developments and changing market conditions in foreign fisheries have an increasingly greater effect on domestic fisheries. Adequate knowledge of these developments and changes as they occur is essential to the domestic industry and the Government. Within the past few years fishery attache posts have been established at Mexico City, Tokyo, and Copenhagen. The value of these posts has been demonstrated. However, many important geographical areas of the world remain inadequately covered. At least three additional posts in Europe, Asia, and Africa are vitally needed to cover worldwide developments of significance to the American fishing industry.

Prompt Application of Technical Findings

The fishing industry has been quick to make many improvements, but the prompt use of additional modern techniques can help it acquire new vigor and improve its competitive position. Examples of modernization that can be of great help in various fleet and shore plants include full use of the following: (1) electronic depth-finding and fish-finding equipment and modern navigational aids; (2) improved

net materials; (3) mechanical aids; e.g., power block; (4) landing, holding, unloading, and butchering techniques that are economical and rapid, yet appropriate to the high-value protein food involved. Still other examples of improvements that must be sought include the utilization of the air-bubble curtain principle in fishing, the wider use of midwater trawls, and the utilization of fishery products preserved by nuclear irradiation. The Bureau has a responsibility to inform the industry of these developments. Only by an awareness of possibilities for improvements and the aggressive application of new techniques and equipment can the industry move forward and take full advantage of the advances in research, development, and services envisioned in this report.

Higher Quality Products

Industry-Government cooperation in the past has resulted in the establishment of programs to (1) develop nationwide voluntary U.S. standards of quality for fishery products and (2) inspect fishery products for conformity with the standards. The standards development program affords industry the tools and techniques for advantageous improvements in plant sanitation and quality control procedures. With the broader application of these approved control measures to the screening of incoming raw materials received from the fishermen, to the design and maintenance of processing equipment within the plant, and to the promotion of good sanitary practices aboard the vessels and in the processing plants, higher quality fishery products will reach the consumer and will benefit the industry by greater consumer acceptance. There is need, too, for assistance to industry in the marketing of perishable fishery products. The Bureau believes that although rapid improvements in the quality of fishery products have been made during the past few years, even greater efforts in this area will supply special impetus to increase consumption of fishery products, not only in this country but throughout the world.

Joint Market Promotions Advocated

Since the United States is the world's principal market for fishery products exported by other countries, the burden of stimulating consumer interest rests jointly on the foreign as well as the U.S. processors who sell in this market. Some efforts along these lines already have been made--others are in process. The extent of participation in market promotion should be proportionate to the share of the market enjoyed by domestic and foreign processors. The Bureau can exert a beneficial catalytic action by encouraging this type of accepted consumer stimulation.

Training Marine Scientists

The Bureau recognizes the critical and growing need for trained research scientists to increase knowledge of the living resources of the sea. This need will be met only if the Bureau is successful in stimulating the interest of promising young students in the marine sciences and providing them with the type of education and training that will best equip them to carry out research assignments. Toward these ends the Bureau is analyzing and evaluating its experience as the largest single employer of marine research scientists for the purpose of defining the optimum academic preparation and training for marine biological research. The results of this evaluation will be used to improve standards of selection and to encourage students to enter the field of marine science by making careers in marine science more attractive to talented students. To accomplish this, the Bureau is taking action to utilize more effectively the capabilities of its employees who demonstrate high potential for research, and to maintain a working environment for the research scientist that will provide the necessary professional contacts, recognition, and training opportunities. The Bureau is currently expanding its support of the training of marine scientists through grants for fellowships and research to universities and research institutions.

**Insurance
Reductions
Can Offset
Rising Costs**

One of the principal contributors to increasing operating costs for the fishing industry has been the sharply rising vessel hull and protection and indemnity insurance costs. This rapid increase in the cost of insurance has been caused by the rapidly rising rate of sinkings and accidents to vessels and the number and size of personal injury claims. The loss experience of insurance companies has caused many to withdraw from the fishing vessel insurance field, and the decreased competition between companies has brought even higher rates. While fishing is accepted as a hazardous occupation, many of the marginal accidents can be eliminated by carefully planned joint safety campaigns of industry and Government. Government safety officers can analyze accident records, point out danger spots which need protective devices, test new safety equipment and bring it to the attention of the industry, develop appropriate safety literature and posters, and coordinate safety campaigns. With personal injuries decreased, the costs of vessel operations can be reduced, making U.S. products more competitive with imports and competing animal protein products.





A Meteorologist (right), explains the method for determining monthly changes in sea surface temperature. Observing are two Stanford University students employed part time in oceanographic studies of the North Pacific Ocean.



Systematic collection and analysis of plankton organisms as part of a study of ocean environment are conducted in both the Atlantic and the Pacific. Here a Bureau biologist is sorting fish larvae taken by the M/V Theodore N. Gill in Atlantic coast waters.

PART II - THE LONG HAUL

Long Range Planning A deeper look into complex problems facing the fishing industry today is a look into the major long-term trends that have produced the critical problems now showing on the surface. The short range plan recommends actions which can be taken immediately to remedy some obvious ills. These recommendations leave untouched underlying basic problems of economics, biology, technology, and oceanography for which we must seek solutions. These problems must be identified and a long range plan designed to help solve them. In short, we must understand the relationships between the resource and its environment. Then we must use this basic knowledge to utilize more completely and economically the living resources of the sea and of our major bodies of fresh water.

Future Problems It is necessary not only to define the present problems and deal with them, but also to look ahead and prepare for the future. This is essential for short and long range planning.

World Trend Worldwide dependence upon ocean resources is destined to become very much greater as the world's population grows. With the total population expected to increase from over 3 billion in 1962 to 6 billion as early as 2000, full economic development and use of aquatic resources is essential to our future well-being. This country, though lavishly supplied with food now, cannot hope to remain immune from these future world population pressures.

Balance Resource Utilization The U.S. market for fishery products has already expanded rapidly due to the growth of our population from 151 million persons in 1950 to more than 190 million in 1963. This continuing increment will require more than a 3-billion-pound increase in the supply of fish by 1980. This country cannot afford to rely solely on foreign sources to supply this increase. Balanced utilization requires that a proportionate amount of this increase be provided by growth in domestic production. In the long view, maintenance of presently used resources and development of the latent resources of the sea assume great importance to the well-being of our country.

Fear of Overfishing The interest of the Government in fishery research was first stimulated by the fear of overfishing--fear that fishing would be so intensive that the resource could no longer sustain itself by natural reproduction. This led to a program of artificial propagation of fish and 50 years ago hatcheries were hailed as the answer to all the troubles of the fishing industry.

Scientific Fishery Management Meanwhile, a more sophisticated concept was developing, based on the knowledge that an optimum sustained annual yield can be harvested from any living resource, and that this optimum yield can be determined by scientific research. This is the goal for fisheries just as it is for agricultural, forest, and game management.

Natural Fluctuations Important Concurrent with this evolution in the philosophy of fishery management, the realization grew that nature also affects the abundance of aquatic animals and their vulnerability to capture. These changes wrought by nature can cause fluctuations in the catch that may work great hardship on the industry, and which often are attributed

erroneously to the effects of fishing. The modern concept recognizes that the size of the potential harvest depends upon the effects of fishing and other manmade sources of mortality, and upon fluctuations caused by natural forces.

Our population growth, the change from rural to urban economy, and industrial development have caused increasing complications to our fishery resources: First from domestic wastes; then from dams, industrial wastes, channel and harbor improvements, marsh drainage, and conversion of marshlands and backwaters to residential and industrial sites. More recently the widespread and rapidly expanding use of insecticides, herbicides, and detergents, and a host of other technological developments have posed serious threats. And now the possible dangers introduced by disposal of radioactive wastes from research, industry, and nuclear powered ships into coastal waters are a real problem.

The changing ways of American life also have caused changes in our fisheries. Prosperity and high standards of living, interacting with the rapid growth of the world's populations, have placed the U.S. fishing industry at a competitive disadvantage with other fishing nations, many of which can land fish on our shores at prices that would not bring a profit to our own people. The need to increase fishing efficiency, by shortening the time or effort necessary to make a catch and bring it to port, has never been more urgent. Properly planned biological and oceanographic research and exploratory fishing and gear research will make important contributions to this objective.

Many of the older fisheries have become mature in the sense that mere increases in the amount of fishing or extension of the fishing area will not bring about an enduring increase in yield. For these fisheries, an increase in fishing intensity divides the catch among more fishermen with a smaller share going to each, or may, if adequate controls are not applied, take so many fish that the success of reproduction is reduced. From the stocks supporting these older fisheries, increased catches may still be won, not by more fishing but by fishing more wisely. This has already been proven for halibut and may soon be proved for haddock. The only solid base for accomplishing such increased productivity is adequate scientific knowledge gained through a well-balanced, sustained research program.

It would be wrong to create the impression that there has been no research or that the results of past research have been of no benefit to the fishing industry. But many research projects began when declines in one fishery or another aroused public concern. Many were commenced on a "crash" basis and have drained support from other equally needed researches, often of greater basic importance. Repetition of this process through many years has spread research effort too thin and has prevented solution of fundamental problems.

Nevertheless, a great deal has been learned about the fishes that have been studied, and this fund of knowledge lays a firm base for more rapid advance toward gaining the additional knowledge required for practical applications. For many of the important food fishes,

considerable knowledge of the necessary details of life history, such as spawning times and places, migrations, age, and rate of growth, is available. For some, we have learned how to measure natural mortality and fishing mortality and the rates at which these can take place and the stocks still be replenished. The time has come when an adequate force applied to the remaining problems will yield the knowledge required to apply the right amount and kind of fishing effort to get the maximum sustainable yield in the most efficient manner.

Carefully planned and adequately supported research is therefore a prime element in the recommended plan. It includes not only catching up with events in our traditional fisheries, but embraces the development of basic knowledge which we hope will lead to controlled shellfish culture on an industrial scale. For the erratic pelagic fisheries of the open sea, it embraces also the study of the fluctuating ocean environment as it affects fish supplies, with a view to alleviating the disorganizing effects of alternate scarcities and superabundance. For anadromous and inland fisheries, it embraces development of methods to mitigate the effects of power dams and other water resource developments. The goal through research is twofold: To keep our fishery resources at their highest productivity now and to leave them healthy and productive for posterity, and to ascertain how to harvest greater quantities of living resources of the sea by new and vastly more efficient methods.

Making the most of traditional fish resources should be supplemented by developing new ones. If the United States is to have a dynamic, growing industry, it must, like other industries, look to new supplies and new products. Exploration and development is an exhausting, time-consuming, and extremely expensive undertaking regardless of whether it is aimed at the location of new oil fields, mineral deposits, or fishing grounds. Huge oil exploratory efforts seem commonplace because they have been given much publicity. Fishery exploration is just as difficult and expensive. But because of the initial cost and the extremely high risks for a relatively low monetary return, development of new fisheries must lag unless the cost is widely spread, as it is when the Government undertakes it. The discovery of additional fishery resources becomes a principal concern of the Bureau if it is to assist the fisheries to keep pace with population growth and other industry development.

In another field and for similar reasons, the fishing industry has also lost ground during the upsurge in our economy. Other growing industries have increased their efficiency of production through improved machinery and processes. But in many areas fishing is practiced today much as it was 100 years ago. Some mechanization has taken place but it has been very modest. Indeed, many of the engineering data required for improvement of gear do not exist, and it is impossible for small business units, such as the individual vessel owner, to develop much information. Again, if the industry is to keep pace, gear improvement must enter the planning. This holds for fish finding as well as fish catching. Instrument companies are developing many new contrivances, almost always aimed at a market far larger than our fishing fleet. Adaptation of such instruments to fishery use becomes necessary to accomplish desired goals. Methods to break down age-old prejudices against improvements in efficiency of catching techniques, in the mistaken belief that they will lead directly to depletion, must be developed and promoted.

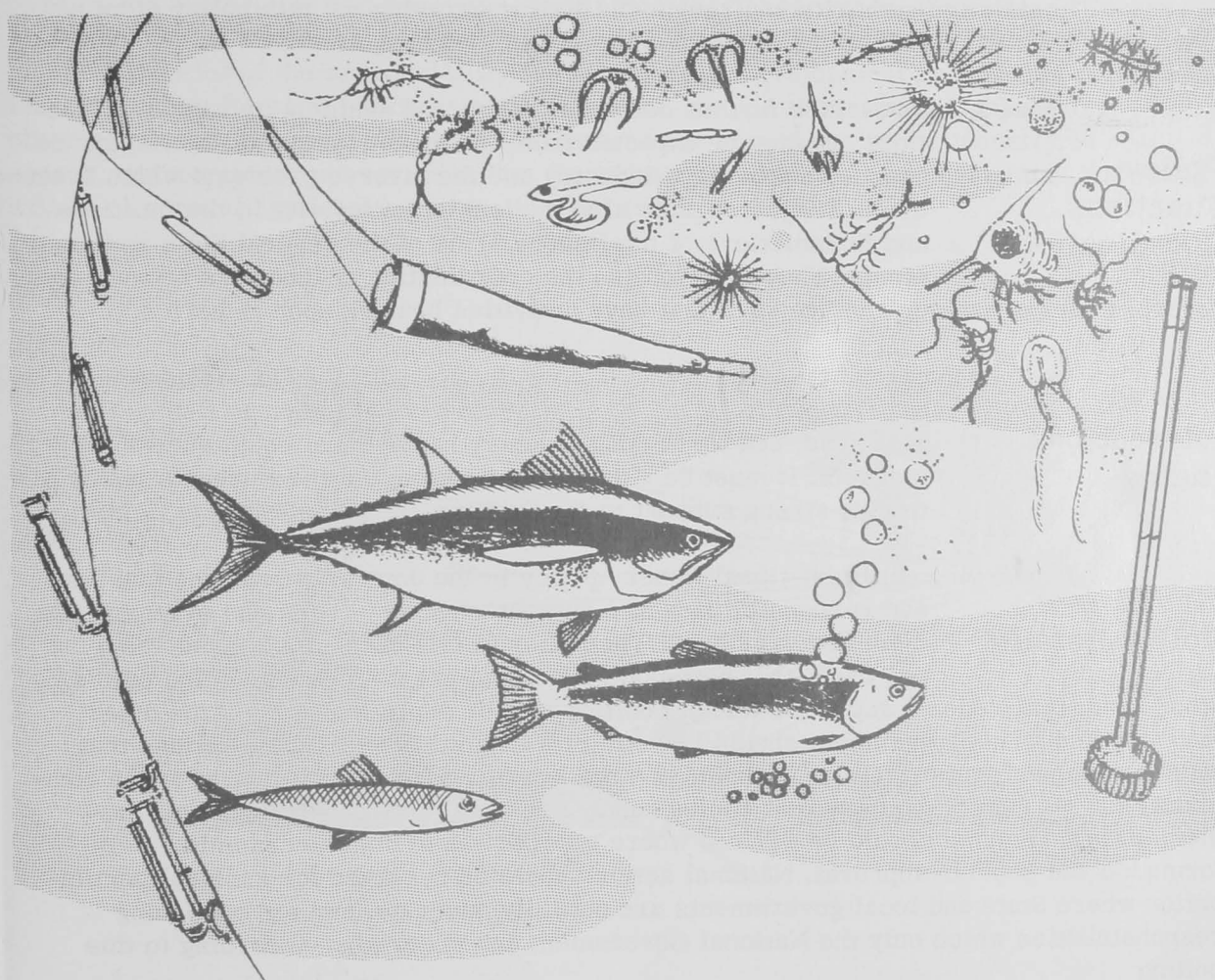
Technological Advances

Technological research to develop new and better products, improved preservation processes, and other improvements tending to swell the flow of consumer products, is a necessity in our expanded economy. Large industrial establishments have their own research departments for these purposes, but in fisheries, as in agriculture, this research assistance is forthcoming only if the costs are divided among the many.

Trade and Market Services

Requirements are similar with respect to statistical and trade reporting services, market development, and economic studies, all of which are specified as functions of the fishery arm of the Government by the Fish and Wildlife Act of 1956.

The following pages develop policies in greater detail, describe the problems, and outline projects that should receive attention if the trend is to swing upward for the fishing industry in the near future. As will appear, this plan of research, development, and services is geared also to participation of the Government's partners in this effort; the States, international organizations, the fishing industry, the consumer, and the general public.



THE NATIONAL FISHERY POLICY

The Congress established a sound and comprehensive national policy in the Fish and Wildlife Act of 1956:

It is the National Fishery Policy to:

(1) Increase and maintain forever, for the people of the United States, a fishery resource capable of yielding the maximum annual product.

(2) Strengthen and maintain a vigorous fishery industry by assuring full and fair access to its raw materials and full and fair access to the American market.

(3) Do these things in partnership with the States and in full accordance with our international obligations, and without sacrificing the system of free enterprise.

Legislative authority and responsibility for carrying out this policy stem not alone from the Act of 1956, but also from a number of previous Acts.

Policy,
Functions
Coordination

These Acts prescribe further details of policy and assign a multitude of functions, as may be expected from the varied nature of the fishery resources and fishery industry and the diverse problems which beset them. They recognize also the lack of uniformity in the functions and jurisdictions of the fishery arms of the several State governments. They involve also the coordination of functions between the several Federal bureaus and agencies that have activities bearing upon fisheries.

International
Rights

Most important of these functions is coordination with the Department of State to ensure that U.S. fishermen have the right to fish on the high seas, and the fishing industry has general equal access to markets. It must be a paramount element in the Bureau's policy to give strong support to the Department of State in this field.

Policy Details

In carrying out the national fishery policy in the domestic field, the functions and responsibilities of a number of other groups and organizations must be considered. The policy in this area should assure, on the one hand, that necessary functions are not neglected, and on the other hand, that Federal activities do not conflict with or duplicate those of the other organizations. The Government should leave to private initiative all the functions that citizens can perform privately. It should use the level of Government closest to the community for all public functions that can be handled at such level. Cooperative governmental arrangements should be utilized where appropriate to obtain economical performance and popular approval. National action should be reserved for residual participation where State and local governments are not fully adequate, and for continuing responsibilities which only the National Government can undertake. According to this policy:

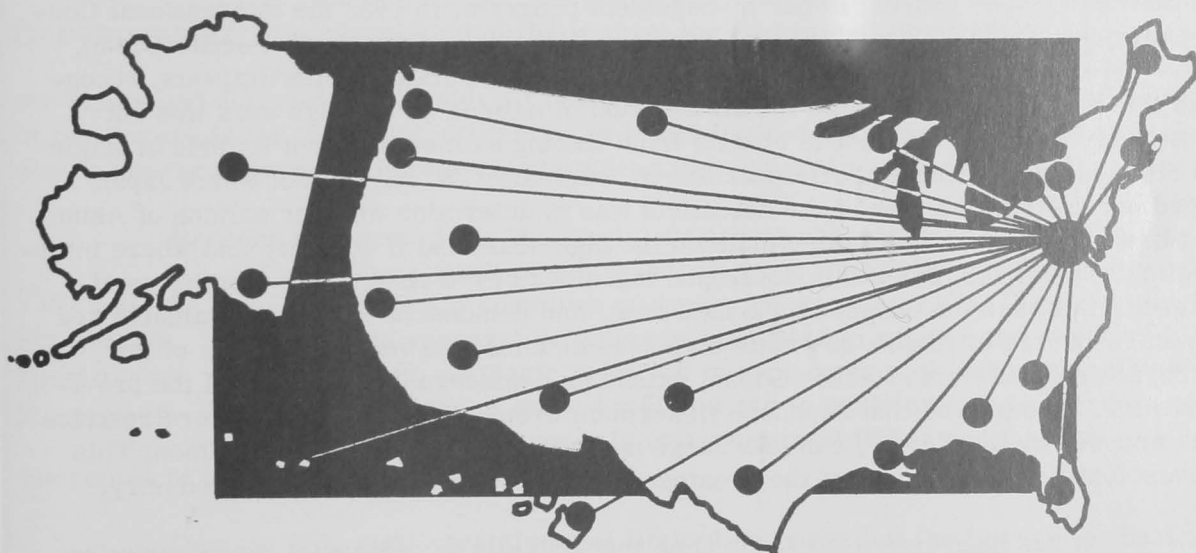
1. The Federal Government should not regulate commercial fisheries in any State waters, except as may be required by treaty.

2. The Federal Government should provide for conservation research where it has the primary regulatory obligation, where it becomes the research agency under international convention or interstate compact, and where widespread resources are beyond the capability of States individually or jointly to perform comprehensive investigations.

3. The Federal Government should perform directly, or through the States, the research and surveys necessary to protect and enhance the fish resources on Federal lands or where Federal engineering projects affect the resources.

4. The Federal Government should be consistent within itself. Interbureau and interdepartmental cooperation is vital where functions of more than one agency relate to the fisheries.

5. The Federal Government should provide services and pursue research in areas where fishermen, the fish trade, the fishing industry, or the State are not capable of providing for them without Federal assistance. Technological research and development of new products should have as their goal the solution of basic problems, and should be carried to the point where industry can carry on the application of these results. Regarding the exploration and development of new fishery resources, the Federal Government should chart new areas of potential production, develop and recommend the gear to be used, then leave the responsibility for commercial development beyond this point to the industry itself. Parallel policy criteria should be applied to statistical, marketing, and other services. In general, the Federal Government should assist the industry in research, development, and services that the industry is incapable of performing and which will be of general application rather than of benefit to the few.



PAST, PRESENT, FUTURE

Research Is Costly and Difficult

Research on aquatic resources is difficult and costly. Such research must be done in a medium which is not man's natural environment, gathering information by probing blindly from above, working from extremely expensive yet unstable and crowded platforms (ships), subject to all the vagaries and dangers inherent in oceanic weather, and able to identify the geographic location of our observations quite inaccurately by scientific standards. It is truly remarkable that with limited resources and relatively primitive methods we have been able to gather so much useful information about a domain so vast and so mysterious as the sea. The problems of devising methods of capture, tracing migrations, studying geographic distribution, and counting and measuring rates of birth, growth, and mortality of fishes have been likened to the task of obtaining similar information about a herd of cattle in a field, from a balloon drifting above solid cloud cover, with a lariat as the only sampling tool.

Realism in Budgeting

Experience has shown that there is a certain threshold in budgeting for many kinds of research below which achievements are limited and never fully effective, but above which rapid progress can be made in reaching objectives. Two principal requirements, intelligent planning and adequate financial support, must be met if the threshold is to be identified and surmounted. On the other hand, budgeting must be held within the bounds of effective use and must not exceed the limits placed by available equipment and personnel.

Rehabilitating the Salmon Resources

The great salmon runs of the Pacific Northwest and Alaska are among the Nation's most valuable fishery resources. Resumption of Japanese high seas salmon fishing after World War II offered a serious threat to our management program. In 1953 the International Convention for the High Seas Fisheries of the North Pacific Ocean, with Canada, Japan, and the United States as participants, recognized this problem. At that time the distribution of salmon on the high seas was not known, and Japan's agreement to abstain from fishing salmon of North American origin was effected by creating a provisional line at longitude 175° W., east of which Japan agreed not to fish. The task of the scientists was to determine whether salmon of Asian and North American origin intermingle on the high seas; and if so, when and where intermingling occurs. U.S. scientists developed ingenious new techniques to identify continental origin of salmon caught on the high seas, and demonstrated that the valuable red salmon resources of Alaska dominate high seas catches in a very large area of the Bering Sea and the North Pacific Ocean, extending considerably westward of the provisional line. This proved that Japanese fishermen, even under the rather severe restrictions imposed by the Treaty, can take large numbers of North American salmon. This was a scientific achievement of the greatest importance to the U.S. fishing industry.

Medicinal Value of Fish Oils

It has been known for some time that fish oils have unusual characteristics that set them apart from other animal oils, but the limited levels of past research prevented development of a sufficient understanding of these characteristics to develop their uses. Recently, a concentrated study of the fatty acid components of fish oils has led to a research breakthrough. The unsaturation of the fatty acids, which has limited the use of fish oil in its natural form, now shows promise of being a

valuable characteristic. Research with Bureau funds has shown that these fatty acids are unusually effective in reducing the level of cholesterol in the serum of animal blood. Cholesterol is believed by some researchers to be involved in the occurrence of atherosclerosis, a type of hardening of the arteries. This exciting discovery has attracted wide attention, and equipment is already set up to produce adequate amounts of highly purified fish oil fractions for use in medical research. A successful conclusion to this limited but important phase of research could be of immeasurable value to people throughout the world.

Other Solid Accomplishments

Many other solid accomplishments have been achieved since the end of World War II. On the Atlantic coast the Bureau has investigated the decline of the shad fishery and has made recommendations for rehabilitation of runs in certain rivers. The Bureau has discovered valuable new shrimp grounds off the Alaska peninsula and in international waters off South America which are now being

fished commercially by U.S. vessels. A great deal has been learned about the behavior of salmon in fishways, and this has led to simplification of the structure of fishways and to the design of fishways that are effective in passing salmon over lower dams. The Bureau has developed a method of guiding and capturing fishes with curtains of air bubbles. This air-bubble curtain is now in commercial use. It has demonstrated the feasibility of trawls for catching fish in the Great Lakes, and this development promises to relieve economic distress in certain fisheries of that region. Successful methods for eradicating the destructive sea lamprey from the Great Lakes have been devised, and the next step, rehabilitation of the lake trout resource, is underway. A voluntary inspection and certification service has been set up for fishery products and standards of quality have been developed, which will greatly improve marketing of fishery products and which will assure the housewife of consistently good quality at the market place. These are but a few recent achievements.

Oceanography

Oceanography in the broad sense is the study of all phenomena that take place on and beneath the surface of the sea, whether they relate to the circulation of the waters, their chemical composition, the contours and structure of the bottom, or the habits and inter-relationships of the plants and animals that inhabit all levels of the sea. A principal objective of the work of the Bureau is the maximum utilization of the living resources of the sea, and the Bureau's research program in this area is essentially a program of oceanographic research.

Too Little Stress on Basic Research

Because the work of the Bureau is of very direct interest to the fishing industry, much of the research program has been oriented toward solution of questions of direct practical concern. Consequently, basic research is only now beginning to receive the attention it deserves, yet basic research is necessary to the understanding of the causes of these problems and to deriving results of real and lasting benefit not only to commercial fishermen but also to all the people of the United States.

Achievements in Basic Research

Despite what until recently were limited resources of the Bureau for basic investigations in oceanography, this field has not been neglected entirely, and several important advances have been made in recent years. In the Central Pacific, Bureau scientists have discovered new areas of high biological productivity, heretofore unsuspected, and have demonstrated that the open ocean is by no means that desert it was popularly supposed to be. A Bureau scientist discovered also a major new ocean

current, flowing eastward well beneath the surface and carrying more than a thousand times the volume of water discharged by the Mississippi River. The Bureau has identified and described the complex oceanographic processes that govern the movement of skipjack tuna into the area covered by the Hawaiian fishery.

In the Atlantic and Gulf of Mexico, Bureau scientists are faced with even more difficult questions, for the important fisheries and concentrations of marine life are found in the coastal areas where oceanic circulation is far more complex. Scientists are just beginning to realize the great importance of the estuarine environment, which harbors large permanent stocks of oysters, crabs, and many kinds of fishes, and which is an important nursery ground for young shrimp, menhaden, and other rich marine resources. This environment is much more complex than the open ocean, hence much more difficult to understand, yet limited efforts in research have been fruitful. We understand something of the important effects that temperature and salinity changes exert upon the movements and abundance of clams, oysters, shrimp, crabs, menhaden, and other life. Bureau scientists have succeeded in the difficult task of learning how to grow and maintain in the laboratory continuing cultures of the microscopic organism that causes periodic disastrous outbreaks of red tide in the Gulf of Mexico. This achievement means that we understand the conditions necessary for survival and reproduction of this tiny organism, the conditions that trigger red tide outbreaks. It means also that we have a constant supply of these organisms for further research, hence do not need to wait for outbreaks in order to obtain material for study. The Bureau has been successful in breeding artificially, and maintaining in the laboratory, successive generations of oysters and clams. This achievement offers exciting possibilities for breeding shellfish for fast growth, disease resistance, high survival rate, fatness, flavor, and a host of other desirable qualities. Progress also has been made in the development of chemical controls for shellfish predators.

In both oceans the Bureau is exploring the relation between meteorological conditions, oceanography, and the distribution, migrations, and abundance of marine life. These new investigations, based at Stanford, Calif., and Washington, D.C., are beginning to clarify the ways in which changes in atmospheric pressure influence ocean current patterns, which in turn alter routes of fish migration and affect survival and growth rates. In both oceans, also, basic studies of distribution, growth, and survival of fish eggs and larvae in relation to oceanographic conditions have produced results of wide interest. The new research vessel for the North Atlantic, the Albatross IV, will allow the Bureau once again to pursue these important oceanic investigations in a region of great international importance, where 12 nations, including the U.S.S.R., are operating and expanding their fishing interests.

A long range objective of the Bureau is to expand its activities in basic research to achieve a necessary and equitable balance between basic studies and their application to the welfare of the United States and its citizens. This will require attention to many lines of inquiry long neglected because facilities are inadequate. Many of these neglected fields have been recognized in reports such as those of the Committee on Oceanography of the National Academy of Sciences. This Committee has recommended that the Bureau of Commercial Fisheries begin new work or expand present investigations in such diverse fields of oceanographic research as fish survival, disease, and behavior; genetics, distribution, and classification of marine life; possibilities of

increasing the biological productivity of the sea by adding or redistributing nutrients, transplanting organisms from one part of the sea to another, or growing animals under controlled conditions in ponds; utilization of unmanned buoys and other new devices, such as submersible chambers like the mesoscaph, for making oceanographic observations; determination of physical, chemical, and biological inter-relationships in estuaries; and cooperation with the Navy, Coast and Geodetic Survey, National Science Foundation, and other Government agencies in the operation of a National Oceanographic Data Center. The Bureau is increasing its activities in these fields as circumstances and facilities permit. The Bureau strongly endorses the National Oceanographic Program and is playing a leading part in its development and coordination.

U.S. Position in World Fisheries

Despite the relatively low per capita consumption of fishery products in the United States, the domestic market is the most attractive in the world. Advanced distribution and merchandising systems for fresh, frozen, and canned fish and the desire and ability of the American consumer to purchase the more expensive products encourage domestic and foreign producers to seek a share of this market.

Often the domestic producer has been unable to meet foreign competition.

Competition for the Catch Increasing

Severe competition for the retail fishery products market is an immediate problem recognized by everyone associated with the U.S. fishing industry. Of equal significance, and becoming more obvious, is the rapidly developing competition for fishery resources of the high seas. During the period from 1950 to 1961, the U.S. catch of fish increased only 9 percent (51 million pounds), in contrast to such striking increases as 1,174 percent (12,680 million pounds) by South America, 135 percent (21,111 million pounds) by Asia exclusive of the U.S.S.R., 133 percent (3,110 million pounds) by Africa, and 99 percent (3,570 million pounds) by the U.S.S.R. Even more significant is the recent expansion by Japan and Russia, whose fleets of large, modern fishing vessels now roam and fish the oceans of the world.

As the trend by other countries toward large, modern fishing vessels increases, intense competition is developing between nations for the fishery resources of the high seas and for markets. Unless present conditions in the fishing industry change, the United States will have difficulty competing for this source of food. Economic conditions in the industry are not favorable to expansion of high seas operations. The competitive position of many segments of the U.S. fishing industry is such that profits have been reduced to a point that has discouraged the construction of fishing vessels sufficiently large and efficient to operate in distant waters. Under these conditions it appears that the U.S. fishing fleet must gradually surrender its position among the leaders in the high seas fisheries, and fishing will decline to a minor position among American industries. Should this happen, the ability of U.S. fisheries to use the high seas for valuable food supplies will gradually be lost.

The Bureau's purpose is to prevent this decline from happening. It will accomplish this by finding enough facts about the oceans of the world and the living resources in them to allow U.S. fishermen to harvest the resources more economically and use them more wisely after they are caught. This will lower the cost of production and ultimate cost to the consumer. In addition, new knowledge will allow conservation of these resources and preserve their ability to produce at the maximum rate. These basic investigations will provide valuable side effects. They will add to understanding of the ocean and its living inhabitants.

THE TASK--TO CONSERVE THE RESOURCE AND STRENGTHEN THE INDUSTRY THROUGH RESEARCH, DEVELOPMENT, AND SERVICES

Two things are vital to industry--supply of raw material and availability of markets.

The raw materials supply consists of the living resources in rivers, lakes, estuaries, and the sea. They are the property of no man until caught. In life they are the concern of the people and can be conserved and managed only by governmental authority--local, State, Federal, or international. Hidden as they are beneath the surface of the water, special and complicated techniques are needed to find out how they can be managed so as to yield maximum sustained production; disregarding jurisdictional boundaries, as they do, necessitates complex arrangements for management responsibility. Those that inhabit the high seas and are fished by several nations require international provision for sustained-yield management.

Marketing problems occur as the result of a varied and perishable product, fluctuating supply, and competition both with a much larger volume of domestic agricultural products, and with foreign fishery products from low-cost, dollar-hungry economies. Sometimes the domestic agricultural products and the foreign fishery products benefit from price supports, subsidies, marketing agreements, and technical assistance programs unavailable to the domestic fishery products.

The plan the Bureau proposes aims to conserve the resource and to strengthen the industry to meet the market problem.

Conservation is a much abused term. It means different things to different people. To people concerned with aesthetic values and the beauty of natural things--a virgin forest, a natural scene or majestic formation of great beauty, or a songbird pouring out a melody--it means keeping untouched and inviolate such soul-satisfying natural phenomena. To people interested in development of a particular resource for a particular use, it means promoting this particular use and protecting the resource against any other use. To the Bureau, working for all the people and charged with developing a program to conserve important living food resources, conservation means keeping the living resource in a condition that will provide the maximum sustained yield of products useful to man. The Bureau believes that this conservation goal will provide the greatest good to the greatest number of people, and its plan is designed to this end.

FISHERY RESEARCH, MANAGEMENT, AND HABITAT IMPROVEMENT

Fishery management is the development and application of measures to secure the greatest sustained public benefit from the resources. This means adjusting the kind and amount of fishing so as to produce the maximum useful product efficiently, while also maintaining the capacity of the resource to keep on producing at this optimum level. It also means enlarging wherever possible the productive capacity of the resource through habitat preservation and improvement.

Living Resources Are Renewable

Sound management requires an understanding of the nature of living resources. The stocks of fish which support the fisheries are self-renewing. They do not exist in limited quantities, like mineral resources, to be used once and thereafter be gone forever. Living resources are more valuable by far than their annual yield would suggest. This is true only if they are managed wisely, and this can be done only if the habits of aquatic animals and plants and their inter-relationships with each other and with the environment are understood.

A Properly Fished Resource Is A Health Resource

Most important to fishery utilization is the capacity of a fish population to restore itself after its numbers have been reduced by natural catastrophe or by fishing. For this reason, a healthy fishery resource is not an untouched population consisting of old, large, slow-growing individuals, starving each other by using up the available food supply and in weakened condition falling prey to disease and predators. On the contrary, a healthy resource is one that is thinned out, leaving food and room for more of the younger, fast-growing individuals to survive. These convert the food of the environment to fish flesh instead of expending it in the intense activity necessary for survival in a crowded environment. Fishing, however, can be so intense that too many fish are removed annually and the population is reduced below the proper level for maximum annual renewal.

Harvesting Maximum Yields

The key to the maximum annual increase in fish flesh, therefore, is to thin out the population so that it can achieve maximum growth in poundage. Too little thinning interferes with the survival of young, slows growth, and leaves fishes to die of natural causes rather than to be harvested by man. Too much thinning takes fish before they have passed their period of rapid growth, thereby cutting down the yield and possibly leaving too few spawners for maximum annual renewal.

Habitat Destruction

The foregoing holds true only where the environment remains constant. Where the habitat becomes changed or restricted by natural events or by man's intervention, the population has to adjust itself to altered conditions. This change has happened too often in lakes and rivers where the environment has been ruined by engineering works or rendered unfit by pollution, and it is happening especially to anadromous fishes like salmon and shad whose migrations to their spawning grounds are being blocked by dams. It is beginning to happen to estuarine fishes and shellfish through alteration of foreshore topography and fouling of the waters by man.

Habitat Improvement

Just as man can spoil the habitat for fish and shellfish resources, he can also alter it in ways that would support larger and more productive resources. So wise use should also include habitat improvement.

Biological Research Problems

It is easy to state the principles governing wise utilization of living resources but extremely difficult to apply them. It is difficult because we do not have enough facts about most fishery resources or the environment in which they live to manage them intelligently. These facts are hard to get because most of them are hidden beneath the surface of the water and concern the subtle relations between aquatic animals and their environment.

Five broad categories of knowledge are needed, and the state of present knowledge ranges from good to poor approximately in the order listed:

1. Life histories--spawning times and places, ages and rates of growth, ages at first maturity, and migration patterns.
2. Population units--the extent of independent or degree of mixing between stocks of fish of the same kind.
3. Population renewal characteristics--effects of various rates of fishing on ability of stocks to replenish the supply.
4. Fluctuations due to natural causes--fluctuations in success of spawning and survival, and fluctuations in "availability" to the fisherman (vagaries of "fishing luck").
5. Environment requirements--what alterations in the environment increase or decrease its capacity to produce. This problem requires detailed study of lakes and oceans.

Life Histories

For most important kinds of fish and shellfish, the principal life history features are fairly well known or will be well known within a few years as a result of projects now underway. Knowledge in this field is fundamental to all other fields, and the Bureau's plan proposes to continue life history studies on an adequate scale to complete them promptly. Many important details remain unknown, however, for even the best known species, and continuous effort will be necessary to bridge these gaps.

Population Units

Research in population units is in a developing state. For example, the populations of Pacific salmon are reasonably well known in river phases and knowledge is accumulating rapidly on their distribution and mixing on the high seas. In a similar state is knowledge of Atlantic and Pacific herring, halibut, and sardines, Atlantic flounders, menhaden, and several others. The Bureau's plan gives priority to completing these studies in areas where the Government has primary responsibility.

Population Renewal

Population renewal characteristics have been determined for only a few of the important sea fishes, halibut, salmon, haddock, and even here only partially. Halibut research by the International Pacific Halibut Commission of which the United States is a member has demonstrated dramatically the beneficial effects of controlled fishing on the increase of weight of fish through growth. The effects of renewal through reproduction have not yet been determined, owing in part to the slow growth and long life of this species. For most major Pacific salmon stocks, the Bureau has demonstrated the

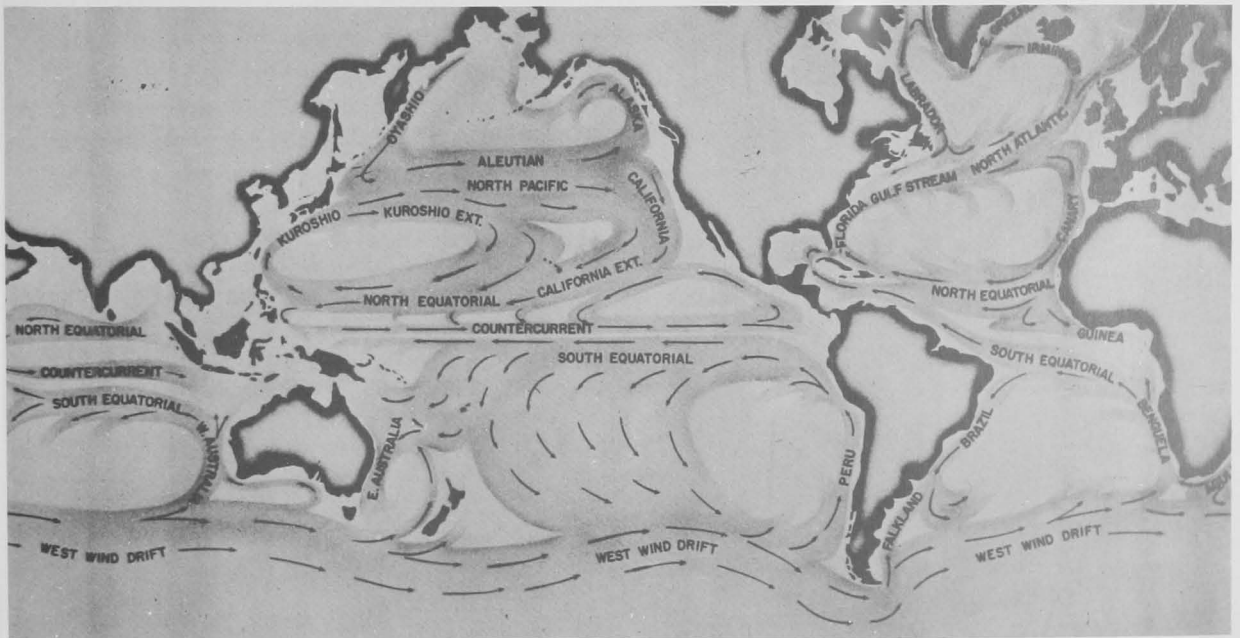
relationship between numbers of spawners and numbers of adults that return to support the fishery or to renew the supply, and thus has improved vastly our ability to restore these valuable resources to levels of maximum yield. This is necessary if the conditions for abstention by foreign nationals from fishing certain stocks of fish in the North Pacific Ocean are to be upheld. For haddock, under study by the Bureau in discharge of its obligations under the International Commission for the Northwest Atlantic Fisheries, small fish are being protected through controlled mesh-size of trawl cod ends. Preliminary results show a gain of 20 percent in productivity from this control measure alone. The effects on renewal through reproduction will not be known for some time. Even with respect to the above-mentioned species, knowledge is yet far from perfect. Much more information is needed about the optimum population renewal for most species, even those which have been studied for many years.

Research for Management

These two long-pursued researches demonstrate several very important principles. First, different kinds of fish require different kinds of management. Radically different treatments were necessary to provide favorable results. Second, extensive research led to proper choice of treatment. Third, salutary management results can be obtained as soon as research is able to estimate the response of each fish stock to various rates of fishing.

Research Takes Time

Progress in this kind of research is slow because observations must extend through several generations of fish and because natural fluctuations obscure the effects of fishing. Progress has been slower than it will be in the future if adequate support is given to the employment of more well-qualified personnel and to the use of modern instruments and modern machine methods of handling data. The Bureau plan promises this needed support and proposes to give priority to those resources for which the Federal Government has primary responsibility and which are in greatest need of research.



The World Ocean, covering 73 percent of the earth's surface, will be called upon in the future to produce an ever-increasing quantity of human food.



Water temperature and salinity variations are an important part of the oceanic environments which control the distribution and abundance of fish. Above, a bathythermograph records water temperature as it is lowered; to the left, a scientist takes a surface water sample.

Natural Fluctuations

Natural fluctuations in abundance and migrations of fish stocks are so little understood that they must receive substantial attention in Bureau plans. However, in this field the Bureau has begun to explore methods of attacking this problem. At its La Jolla laboratory, where the Bureau participates jointly with four California public and private institutions, and at its Woods Hole laboratory, where it is investigating North Atlantic fisheries in cooperation with 12 other nations, the Bureau is attacking the problem as it is manifested in two species, the pelagic sardine and the demersal haddock, about both of which much is already known biologically. A much smaller but equally important project conducted directly by the Bureau is the study of broad-scale oscillations in meteorological and oceanwide sea conditions in the Pacific and Atlantic Oceans in relation to the fluctuations of any fisheries for which sufficient biological and historical data exist.

Estuarine Protection

Many people think that only the rivers are affected by man's activities. But bay and estuarine fisheries for species such as the clam, crab, oyster, and shrimp are also affected by changes in the amount and quality of river flow. Further, their habitat is being increasingly altered by dumping of wastes and by engineering works in the estuaries and bays. Thus inshore waters are affected by pollution, by silting, and by physical changes such as channel dredging and "reclamation" of vast tidal areas. Natural conditions for the productivity of fish and shellfish in these waters can be improved after finding out what conditions are favorable for these fisheries. Then those conditions can be produced in bays and estuaries. The Bureau believes work in this field is most urgent and can be most rewarding in waters which are readily altered by man.

Pesticide Research

Pollution of our natural waters, including that from pesticides, poses a serious threat to the commercial fisheries of the U.S. This is true of the freshwater fisheries of the Great Lakes and the Mississippi River, the growing expanse of reservoirs created by dams; fisheries for salmon, shad, striped bass, and other important fishes which spawn in fresh water but live most of their lives in the sea; fisheries for shellfish or migratory marine or estuarine fishes of our coastal waters; or even the rapidly developing distant water high seas fisheries of the world.

That part of the Department's pesticide research program carried on by the Bureau of Commercial Fisheries has two objectives: To determine how chemicals can be used with advantage to improve fishery harvests and to guard against the adverse effects of pesticides in the aquatic environment, whatever their source.

Pesticides can be an important tool in controlling undesirable competitors and predators on important food fishes. Research is needed to study chemicals which attack certain animals, such as the pesticides which have been developed to kill larval sea lamprey in the Great Lakes. These chemicals are quite specific for the sea lamprey larvae and can be applied at very high dilution rates. Other examples are the specific chemicals which have been discovered to be effective in killing predators of oysters on oyster grounds. Obviously, adequate testing of these specific pesticides is necessary in order to protect the public welfare. Nevertheless, there are great advantages to be gained by the use of chemicals in undesirable species without harm to those that are desirable.

Pesticides may affect fishery resources in many ways, direct or indirect. Some of the direct effects have been measured for certain commercial fishery resources. Other effects, such as reductions in rate of production of microscopic drifting organisms or "plankton" upon which larger organisms feed, also have been studied. Tracing the effects and interactions at all levels in the web of organic production, from conversion of the sun's radiant energy into microscopic plant life through the complex series of transformations that produce living resources of commercial value, will be difficult indeed. The direct effects that produce mass mortalities are easy to detect, understand, and control. It is the subtle, indirect effects that concern us most.

To combat this problem, knowledge is needed of the transport and distribution of pesticide residues through drainage basins into lakes, rivers, estuaries, coastal waters, and the open ocean. It will be necessary to monitor the concentrations of pesticides in natural waters at strategic locations, determine seasonal variations in concentration and distribution, and understand the accumulation of residues in aquatic organisms.

Broad studies are necessary of the effects of pesticides in current use, and those currently being developed, upon all important commercial fishery resources.

It will be necessary to know much more about the accumulation and effect of pesticides in all plants and animals in our waters, from the microscopic plants that convert energy and dissolve nutrients into organic compounds to the commercial fishery resources themselves. The transfer of pesticide residues from one level to another in this complex food web may be the most powerful agent in dispersing these dangerous chemicals.

Information must be developed on the amounts of pesticides retained in the living resources, the amounts remaining in the product as it reaches commercial channels, and the effects of processing techniques upon pesticide content. It may be necessary also to develop new processing techniques to remove pesticide residues from fishery products when necessary.

Acceleration of the Bureau's pesticides research program has begun and further orderly expansion is contemplated.

An expansion of the Bureau's radiobiological studies also is necessary since there is an increasing number of nuclear reactors being built near estuaries, for submarines, for ships, and possibly for rockets. Thus, it is necessary to obtain additional data on the effects of radionuclides on living organisms of the water and on the quantities of radioactivity in organisms in the estuarine environment so that the fishing industry can be advised when confronted with the problem of marketing seafood which contains radioactivity.

A special branch of this field is the development of shellfish culture through control of habitat in seminatural situations. The Bureau is developing a pilot project in this field. It contemplates grouping present investigators of particular estuarine fishes and shellfish into teams and adding the few specialists needed to round out the team talents. Such teams will work as closely as possible with the States conducting studies on estuarine species.

Improving Methods of Shellfish Culture

Coordinated Regulation

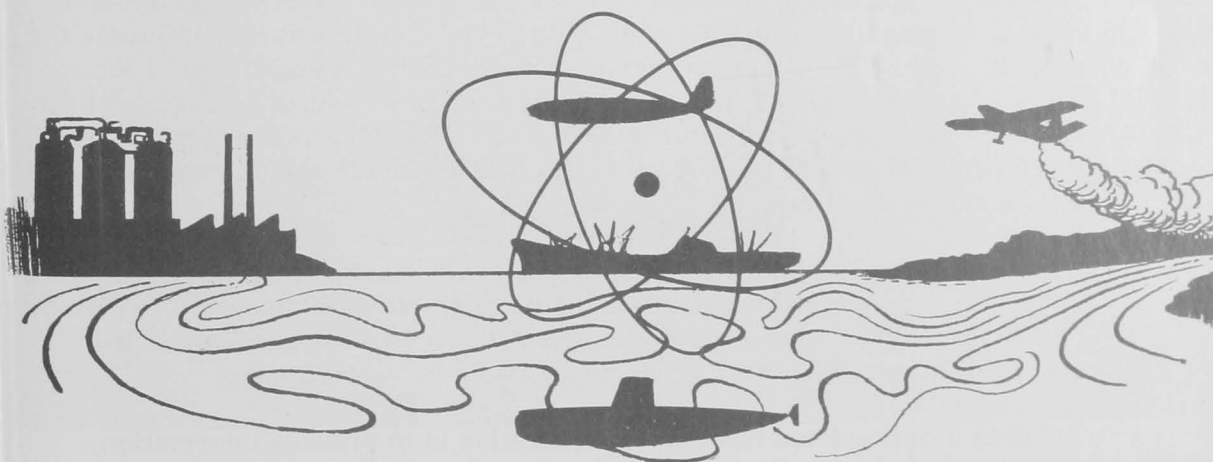
If the fisheries are to be improved to insure maximum sustainable yields, concepts of fishery management must be reviewed carefully. Much has been gained through programs for particular resources such as the halibut. But it is becoming increasingly evident that each fishery will require special methods. This will become possible when research teams studying the various problems within a fishing area learn the relationship between the environment and each of the existing fishery stocks and ascertain what effect an increase in one fishery has on others existing in the same region. Fishery resources that are not being fully used should be harvested to spread fishing resources over a larger number of species and extend the fishing season over a greater period of the year. Where the Bureau offers recommendations for management, it will suggest employment of this concept to achieve the maximum use of fishery resources, with coordinated regulations protecting each fishery in accordance with its conservation needs. Except in special cases, management authority is vested in the States; therefore, the Bureau will cooperate with State and local authorities when special skills and facilities are required.

Regulation Should Not Destroy Efficiency

The Bureau believes that regulations, while they must be effective, should hinder the efficiency of fishing as little as possible. Especially to be avoided is the perpetuation of archaic and inefficient fishing methods, which increase the price of fish and make the industry noncompetitive. More direct and certain methods of giving the needed kinds and amount of protection to the resource must be sought.

Preventive Enforcement

Funds have been provided to discharge the Bureau's responsibility for conducting special enforcement programs in accordance with various international fishery treaty obligations of the United States. The Bureau strongly subscribes to the view that the primary objective of all such enforcement programs should be to prevent violations of existing laws and regulations, rather than to achieve an imposing record of actual violation cases. Its enforcement programs will continue to follow this course.



LOCATING AND DEVELOPING NEW RESOURCES

Increasing Production As most of the long-known and nearby coastal fisheries become utilized to the maximum extent, there is need for locating and developing new fishery resources. Bringing new fisheries into production to keep pace with food requirements of the growing population and with the growing demand for special-purpose materials in pharmaceutical, chemical, and agricultural industries has been given a prominent part in the Bureau's plan. This undertaking must be started well ahead of the apparent need because the time element is important and uncertainties are involved. While in some ocean areas U.S. fishermen are approaching maximum use of the fishery resource, in other regions little has been done to develop offshore fishery potentials. In fact, comparatively little is known about the contents of these vast ocean storehouses. Modern engineering will facilitate tapping of these resources.

Greater Stability The need is not for volume alone. Stability is also to be sought. In many areas of the United States reliance on a few species during a very short fishing season is an economic hardship to the fisherman and the community in which he lives. It may also be a source of inefficiency and high costs to processors who depend on the fisherman's catch for raw material. If additional fisheries could be harvested at other times of the year, a fishing community would have greater stability. Many fishing areas of the United States need a smoothing of seasonal variations.

Offsetting Losses A second and more serious threat to stability occurs when U.S. vessels are forced out of traditional fishing operations by political, economic, or natural causes. Many of the important fisheries, such as shrimp, tuna, salmon, and menhaden, suffer from one or more of these causes. Then alternate and additional fishery resources become particularly important. Regulations essential to national defense, such as closure of important fishing areas for weapon tests, often restrict some types of fishing operations, may control imports, and present a problem in the production of essential consumer products. A persistent problem arises from natural fluctuations in the availability of important fish and shellfish, which occasionally result in catastrophe to some segment of the fishing industry, as, for example, the disappearance of Pacific coast albacore tuna during 1928 to 1938, or the abrupt decline in the Pacific sardine fishery more recently. Fishing activities, themselves, affect the abundance of fish stocks and may influence the stocks' capacity to produce the supply at maximum rate. Until our knowledge of the effects of fishing and of natural factors is greatly improved, we cannot be certain of the relative importance of manmade and natural causes of fluctuations in the supply. Alternate new fishery potentials would cushion such upsets and provide useful margins of safety as our understanding grows.

New Products Exploration can improve the fishery economy by finding totally new products. Such diversification would help to stabilize the industry by broadening its base and would contribute toward higher standards of living by increasing the variety of fish products available to the consumer.

International Aspects An often unappreciated function of exploration is to produce information needed to establish and maintain the interest of the United States in high seas fisheries. Such knowledge strengthens the U.S. position in the settlement of any international problems concerning the utilization of these resources that might arise in the future.

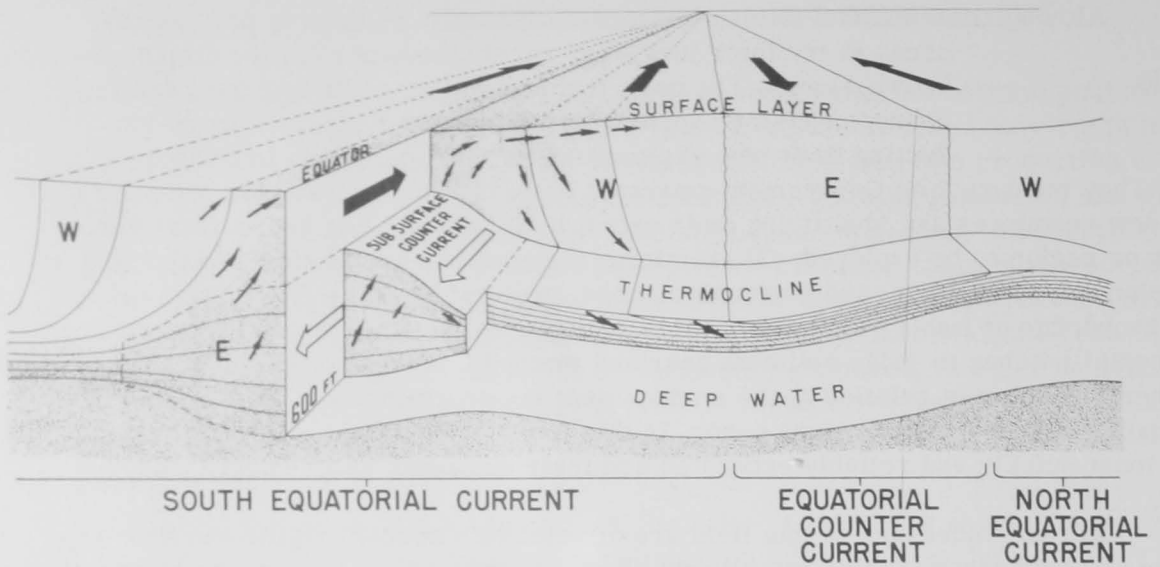
How To Do It

Although commercial fishing vessels occasionally venture to new nearby areas to try their luck, they rarely attempt to probe distant unknown waters. The cost, the uncertainty of finding fish, and the chance of losing expensive gear prevent fishermen from conducting their own exploratory fishing operations in offshore waters. They must rely on Government-operated vessels. The Bureau plan provides for finding new resources and identifying their extent by (1) assembling known facts about the area or region to be explored, (2) examining the area at various times of the year in a well-planned, systematic, and thorough manner, preferably with well-rounded teams uniting knowledge of fishing methods, fishery biology, and oceanography, (3) evaluating experimental catches to judge optimum gear and methods, and (4) analyzing results of experimental fishing in relation to the environment to ascertain when, where, and under what conditions fish concentrations occur. In this way the potentials of the resources may be most quickly and reliably estimated and their economic value surely judged.

Bureau endeavors in this field are of relatively recent origin--the first programs of any consequence were established about 13 years ago in the Pacific Northwest area. By gradual development, individual stations are now located on each of the three coasts of the United States, including Alaska. Because the ocean areas to be covered are so vast, charting of fishery potentials has necessarily been piecemeal. Progress, however, has been encouraging, and in many cases the results commercially significant, e.g. in location of royal red shrimp grounds in the South Atlantic, calico scallop off the coast of Florida, tuna in the mid-Pacific and Gulf of Mexico, shrimp off northeastern South America and in the Gulf of Mexico, deep-water ocean perch, tuna, and lobsters in the North Atlantic, concentrations of bottomfish in the Pacific Northwest, and shrimp off



Traditional methods of purse seining depend on first finding schools of fish near the surface. New methods of locating fish would improve efficiency and reduce costs. Note that the seiner in this picture is not equipped with the power block which has come into such common use in the last few years.



Upstream drift of experimental longline sets prompted research by scientists of the Bureau's Hawaii Biological Laboratory and the discovery by Townsend Cromwell, then staff oceanographer at that laboratory, of a great, subsurface river of easterly flowing water in the equatorial Pacific. The diagram above shows the complex nature of the Cromwell Current.

Landing oceanographic gear on the fishery research vessel, Albatross III, during a demonstration cruise. The device being brought aboard is a Hardy Plankton recorder which measures the quantity of sea life.



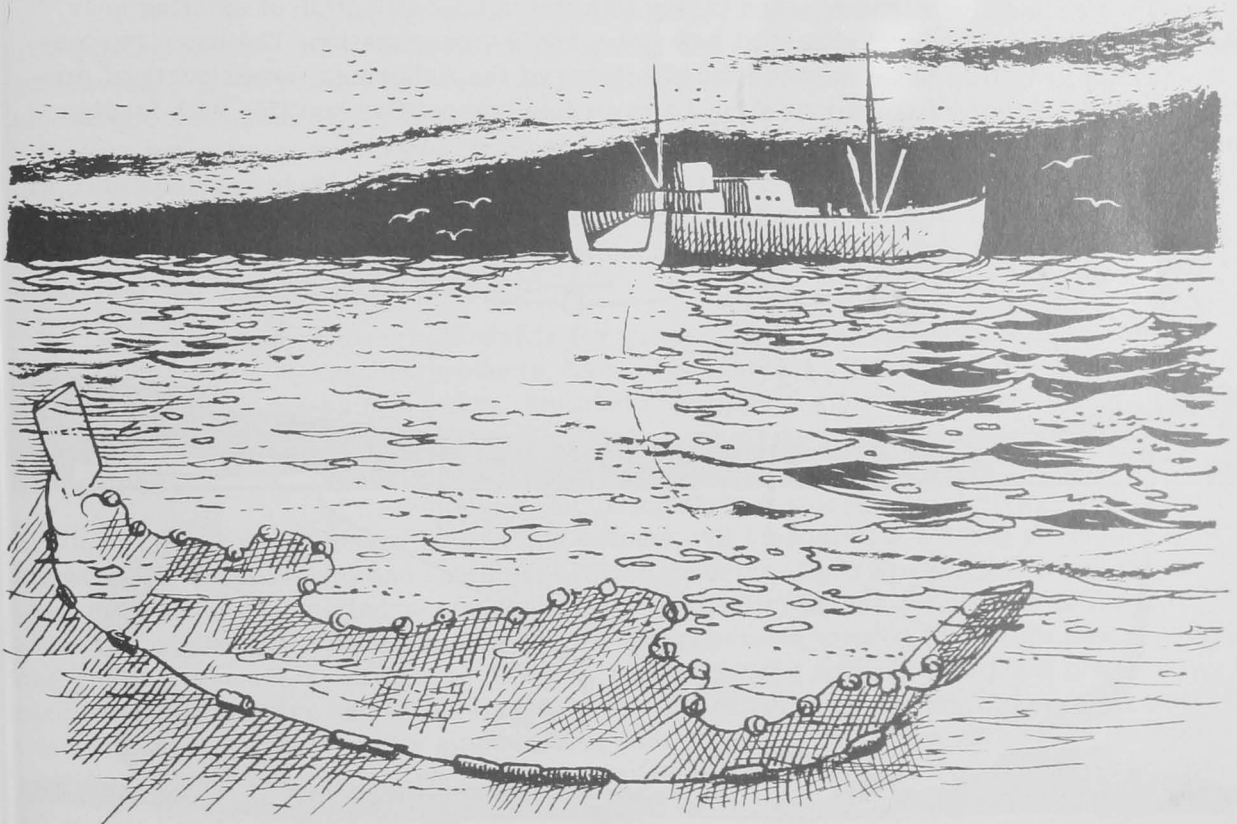
Washington and in Alaska. The Bureau sees this as only a start in ultimate accomplishment. This exploration will be placed on a more systematic basis by increasing the number of vessels suited for the unique requirements of exploratory operations and by providing other facilities, as visualized in the program the Bureau is developing. Priority will be given areas and types of resources which will aid the industry to meet the problems of the immediate future and to provide greater quantities and more variety of fishery products at lower cost.

Follow Through

Other problems must be solved before new resources become producing assets. New products will not sell themselves but need introduction to the consumer. Sufficient demand must be created to encourage fishermen to risk the cost of fitting out for new fisheries. Sometimes new vessels and gear must be developed to efficiently harvest these species. Handling and storage techniques aboard vessels must be developed more quickly. Fishermen now use traditional methods of trial and error that succeed only by generations of practice. Storage, transportation, and marketing techniques for new species must be learned. Bureau programs will locate concentrations of fish and explain the reasons for their existence and their variations; find efficient ways to catch the fish; devise proper methods to handle and store fish aboard the boat; help to solve processing problems once fish are landed; and assist the industry to develop a demand for the product and the public to enjoy a greater variety of protein food.

Industry Takes Over

In this chain of events the States and the Federal Government should plan their work cooperatively with industry, then turn over to private enterprise the development of a productive fishery industry as early as possible.



FISHING GEAR AND METHODS

Lower Production Costs

To reduce production costs, developmental research on fishing gear and methods is necessary to increase the efficiency of the fisherman. The Bureau will evaluate present gear, improve it where possible, and test and recommend use of other types of gear where these would raise efficiency in existing fisheries. Most gear research is too specialized to be undertaken by individual fishermen, yet there is vast room for improvement in fishing gear, which with few exceptions has changed very little for decades. Emphasis is being given in the Bureau to development of gear that will take fish in the unfished intermediate areas, between the surface and the bottom. Considerable attention will also be given to developing effective gear for use in depths beyond the range of the present fishery.

Special Gear Needed

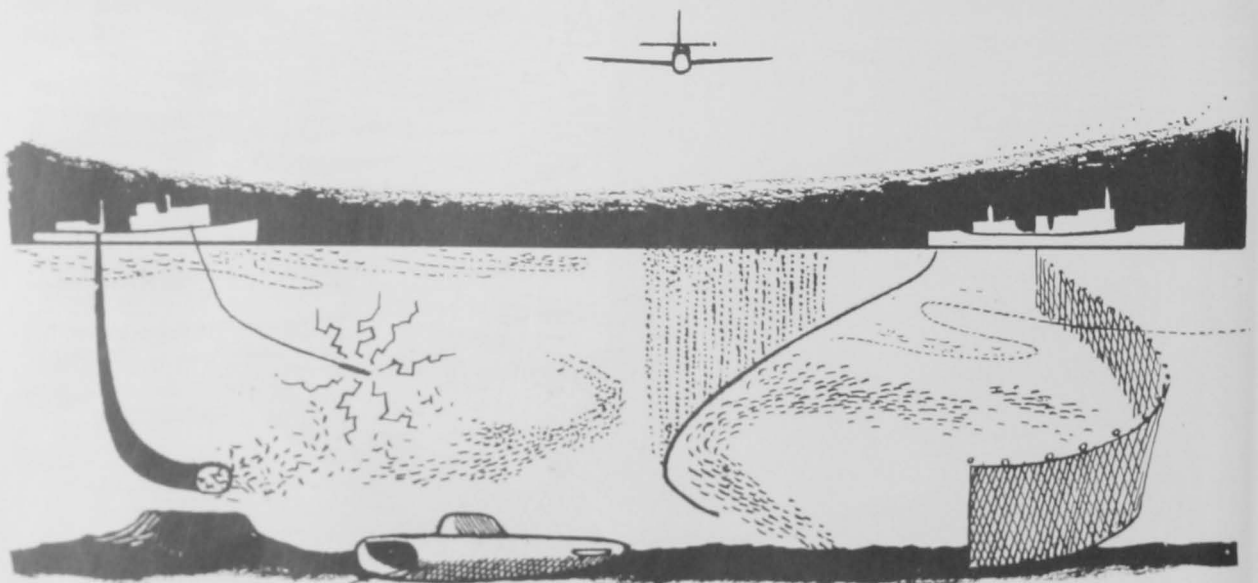
The development of new resources through exploration often hinges on the development of more effective gear. Modification of existing gear may serve some purposes, but development of entirely new methods of capture also will be necessary.

Instruments Valuable

To catch fish it is first necessary to find them. Development of techniques to locate specific kinds of fish through the use of sonic devices shows considerable promise. Initial experiments with trawl cable containing insulated electrical conductors have opened the way to a large number of practicable applications of telemetry and remote control of fishing gear.

Action

The Bureau's gear program is designed to learn the best means of locating, attracting, and taking fish through modification of existing gear, development of new gear, and instrumentation. The basic purpose is to increase the efficiency of the fishermen, lower costs of production, and place the fishing industry in a favorable competitive position with foreign producers.



TECHNOLOGY IN PRODUCTION AND PROCESSING

Fishery products are a source of balanced animal protein. Handled carefully and processed properly, they offer desirable variety and nutrition to the consumer. Greater consumer acceptance requires better maintenance of high quality. A substantial amount of research has

Nutrition

been aimed at product improvement, but the fisheries still lag behind many other food industries. This lag is mainly the result of unique problems of perishability in fishery products. One possible solution lies in the preservation of fishery products through nuclear irradiation. Preliminary Bureau research on this peaceful use of atomic energy has been promising, and further work is planned. This is a countrywide problem which cannot be undertaken by individual segments of the fishing industry or by the States.

The chemical composition and muscular structure of fish and shellfish differ radically from those of mammals. Unlike meat and poultry, fishery products are not improved by aging, but are susceptible to rapid quality loss even at cold storage temperatures that will protect

Perishability

meat. Therefore, at all stages in the handling of fishery products, from sea to consumer, there is need for sound research to minimize or prevent quality losses in flavor, appearance, and nutritional value. This means keeping the product sea-fresh until it reaches the consumer. A good example of a progressive approach to this problem is a technological research program for freezing groundfish at sea, developed by Bureau scientists. The fish are frozen aboard a research vessel immediately after capture. Further processing of the groundfish in shore plants yields frozen fillets of extremely high quality.

Quality maintenance and economic improvement of the industry will come from wider application of mechanization in processing. The advantages over manual labor are better control of sanitation and greater speed of processing. Faster processing reduces the time

Quality

of exposure of the product to high temperatures and contaminating agents that lead to quality loss. Given these improvements, assurance of uniformity of quality needs consideration. Voluntary U.S. grade standards are being developed and implemented through a Bureau program of continuous in-plant inspection and certification. The inspection program operates at no expense to the Government, since all costs are met by cooperating processors. Consumers can be certain of high quality in those fishery products that bear the U.S. shield, which is indicative of conformity with standards for good plant sanitation and high product quality.

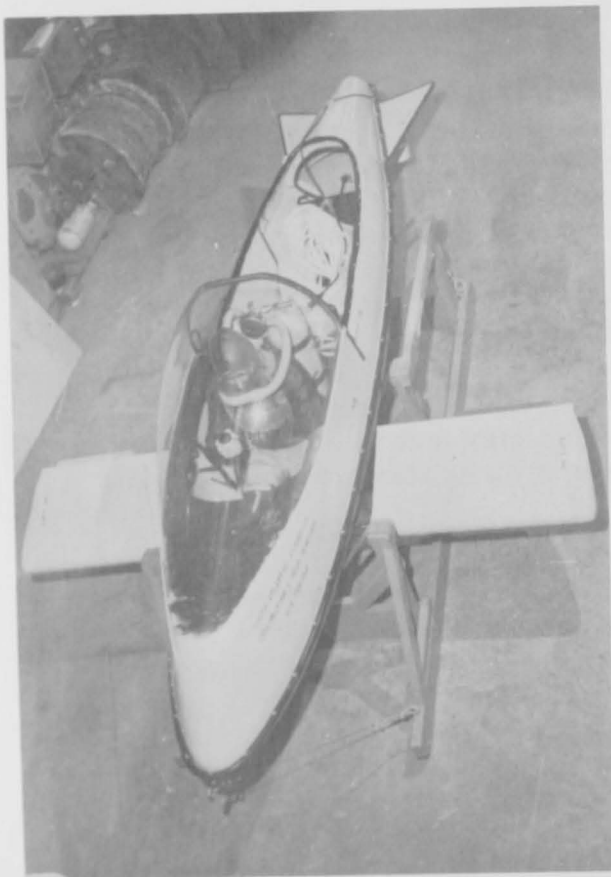
Voluntary Federal standards for grades, not previously available for any fishery products, have been established for such frozen products as fish sticks, breaded shrimp, fish blocks, haddock fillets, halibut and salmon steaks, fish portions, raw headless shrimp, and cod fillets. Many additional proposed standards are in various stages of development, including those for ocean perch, frozen precooked

Standards for Fishery Products

scallops, and frozen dressed halibut and salmon. All standards are being developed with the support, cooperation, and assistance of the industry. This Federal program, broadened to develop and use industrywide criteria for quality standards similar to those for meat and poultry, will be the mainspring of the movement toward quality improvement and greater consumer acceptance of fishery products. An active educational program, sponsored by industry and Government, is now underway to make consumers aware of the availability of high quality standardized fish products. An active nationwide product certification program, utilizing standards developed for each of the major fishery commodities, will be a major factor in increasing the low U.S. per capita consumption of fish.



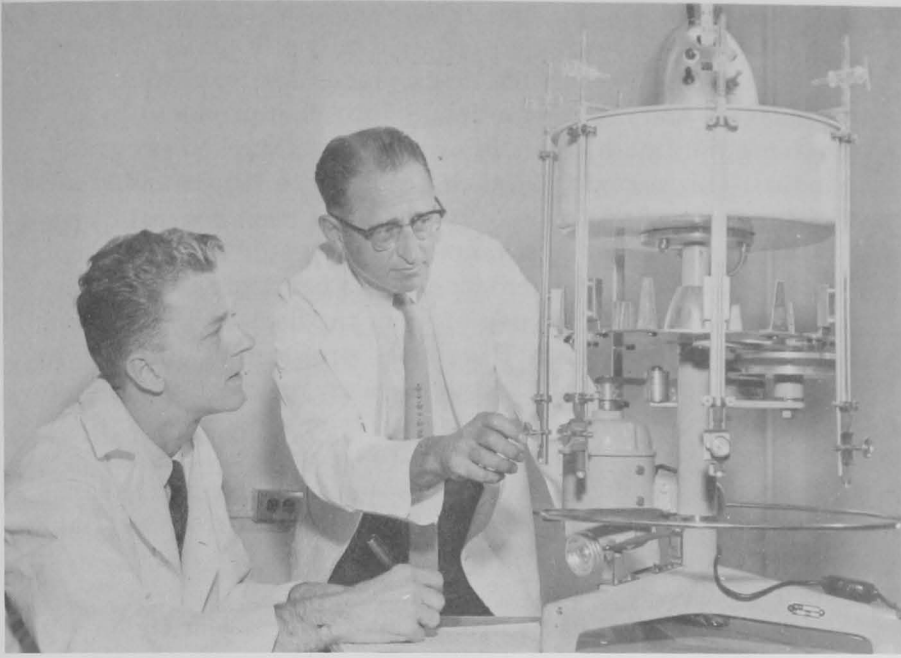
Chemically treated sand is spread over oyster beds as part of the Bureau's research into methods for controlling drilling snails and starfish, major enemies of oysters.



Photographs and motion pictures taken from underwater sleds such as this have been valuable in analyzing and improving the operation of commercial fishing gear.



Portion of trawl with roller gear, as seen by the underwater television camera, shows the manner in which fish enter the net.



Operating of Warburg equipment for measurement of oxygen-uptake by fish oils in a study of their characteristics and potential new industrial uses.



Fish cookery demonstrations and attractively produced TV programs are important aids in strengthening and enlarging the market for fishery products.

Product Advancement

There is a clear field for research on using various species of fish in products designed for the convenience of consumers. Rapidly changing employment patterns are making more places for women in business and industry and creating a demand for fish products in a form requiring minimum effort in preparation. Marked progress has already been made by the industry in packaging of such products as fillets and steaks, in convenient sizes. A further refinement of this type of product has been control of portion size within the package, so that the housewife or restaurant operator need buy and prepare only the exact quantity required to fill the demands of the particular meal. For consumers who find still greater convenience in the use of modern "heat-and-eat" items, such as fish sticks and breaded shrimp, a new product research program would uncover others equally as popular. The Bureau recognizes that the great diversity of species of fish, together with the numerous potential market forms, offers tremendous reward for imaginative development of this trend toward consumer ease-of-preparation requirements and a wider variety of interesting new foods for the consumer. Through research the Bureau will assist in the development of stable, high quality products from available species of fish.

Use More Species

Present knowledge of the nutritional value of fishery products justifies a vigorous campaign to attain an increase in sales on this basis alone. From those species well known to the public, selections can be made to fit the proper diet for any age group, or specialized diets of low calorie, low sodium, or low fat content. Fish protein is easily digested and is among the most biologically complete of all food proteins, with good distribution and balance of the essential proteins, vitamins, and mineral trace elements. The Bureau proposes to inquire into the nutritional potential of species not now used or those that are not fully used so that infinite diversification of food can be realized without sacrificing dietary requirements.

Fish Protein Concentrate

A case in point is our investigations on the process engineering and nutritional value of fish protein concentrate (FPC). One ounce of this dried, powdered concentrate of fish flesh will supply approximately all of the daily animal protein dietary requirement for an active adult and will alleviate the external manifestations of severe protein deficiencies. To lift the daily animal protein consumption level of the world's developing countries above the starvation level of 7 grams (1/4 ounce) per day would require the total estimated annual yield of all of the partially or wholly unutilized species of industrial fishes in the waters immediately surrounding the United States. This sustainable annual yield has been estimated at 9 million tons of fish and would yield approximately 2 million tons of protein concentrate, a quantity roughly equivalent to the anticipated 1963 world protein deficit. A potentially great export market awaits the completion of studies to increase processing efficiency and to assure a uniform highly nutritive quality of the finished product.

Fish Meal Research

A second major outlet for fishery products is in the broad field of animal nutrition, which now absorbs more than 50 percent of the poundage of all fish landed in the United States. Through intensive studies in recent years, the nutritional requirements of livestock and poultry are becoming better known. Fish meal has for many years been an essential ingredient in mixed feeds. Competing protein supplements derived from other sources through research have made available to feed manufacturers a uniform, high quality material. The fish meal industry can only maintain its place in this important and

high-dollar-value field by keeping up with the trend toward research to insure better quality. The Bureau plans to help the fishing industry attain this goal by research on total nutritional value of fish meal.

Animal Feed Uses

In the pet food and fur farm industries, fish is an important source of food to replace increasingly scarce supplies of meat from land animals. The high nutritional value of fish meal is of particular value. Technological knowledge must be acquired, however, to meet these constantly increasing requirements merely to retain the present position in this fast-growing market. As competition becomes increasingly severe, sales must be made on the basis of a known, predictable uniform nutritive value. The many fish species available make it possible to tailor such products to the specific requirements of domestic animals. Bureau research to develop dried or condensed products and to avoid transportation charges for excess moisture and other unnecessary components will make possible greater return for the product itself.

Basic Research

If the fishing industry is to catch up with other industries now solidly entrenched on a broad and integrated marketing basis, it is essential that the study of fish as a source of industrial products be explored and promoted. The Government should share with the fishing industry the responsibility for attaining these goals. The loss of markets for crude fish oil to newer, technologically developed products exhibiting superior characteristics is ample evidence that it is necessary to develop newer and more valuable products from fish oils.

As the results of the basic research conducted in Government laboratories become available, the industry's staffs would continue with the applied and developmental stages of research.

New Industrial Products

Research now underway suggests that merely breaking fish oils into their constituent parts produces groups of compounds having unique, natural chemical reactivities not found elsewhere. A number of entirely new and useful chemical compounds have already been prepared. The Bureau's continuing research program is seeking further knowledge. Research directed toward realizing greater returns from fish will not overlook the possibility of finding chemical constituents of high pharmaceutical value.

DISTRIBUTION AND MARKETING

Trends Dictate Need for Up-to-date Merchandising Methods

Marketers of fishery products have long been aware of the acute need for up-to-date merchandising methods and techniques and are making considerable progress along those lines. However, in the next 20 years the challenge looms even greater than in the past because present trends indicate that:

The population is expected to increase 40 percent, requiring a corresponding increase in the supply of fishery products; experience has shown, however, that the increased demand will be for the more popular fishery items, and the problem of full economic utilization of all products will undoubtedly remain.

Real income will be substantially increased.

Agriculturists expect increases in both production and per capita consumption of farm products.

Chain stores will continue to replace individual shops and the trend toward self-service will increase. Strong competition for low-temperature cabinet space will result in greater demand for fully processed products.

Imports to this country will probably increase.

These factors do now and will increasingly require the fisheries to utilize the most efficient marketing techniques that can be developed if they are to continue to supply consumers with high quality domestic fishery products.

Americans Are Not Fish Eaters

Traditionally, the consumption of fishery products in the United States has been small and has been concentrated in maritime, lake, and river areas near centers of production. In contrast to per capita consumption of meat and poultry products, which has increased from 152 pounds in 1940 on the basis of retail sales weight to more than 183 pounds in 1962, annual per capita consumption of fishery products has remained generally static at 10 to 11 pounds on an edible weight basis. The U.S. population has increased from 132 million to more than 185 million in this same period. Thus, we have an increased total demand for fish even though per capita consumption has not changed. This increased total demand has been met largely from sharply increased imports, which have risen 253 percent since 1940. Future competition from foreign producers threatens even further economic pressures on the domestic industry. From within, domestic agricultural interests are concentrated on seeking a greater share of the consumer's food dollar, sometimes aided by Governmental price supports, marketing programs, or subsidies unavailable to competing fishery products.

Market Promotion

To strengthen the marketing future of the domestic industry and to make fishery products available to more people, industry must make increased market promotional efforts, with Government help when necessary. According to Bureau surveys, only 1 percent of gross income is expended by seafood retailers to promote their products, in contrast to 4 percent by their most direct competitor, the meat industry. Proved,

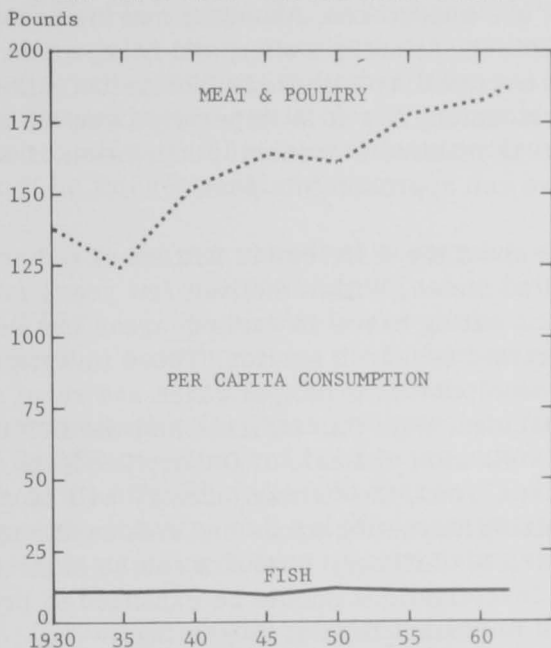
unsubsidized Government fishery aids, such as the Bureau's school lunch program, special marketing programs, and general market development and promotion activities, are available to the industry and have been of considerable benefit.

Most of past Bureau efforts have been aimed at the large volume users of fishery products in the institutional field, such as school lunch cafeterias, public and private hospitals and institutions, restaurants, and dining rooms in industrial plants. Great strides have been made in school lunch activities to acquaint children with the desirable attributes of fish. All States have been covered at least once by school lunch fish cookery demonstrations, and many States have received a second series of demonstrations. In all these States, use of fish in school lunchrooms has been substantially increased.

Fish Cookery Demonstrations

The national school lunch program is a cooperative State-Federal Government

PER CAPITA CONSUMPTION



project, as are Bureau-conducted fish cookery demonstrations arranged in cooperation with State school lunch and institutional directors. School lunch demonstrations will be continued, but because coverage has already been extensive, increased attention now can be given to other facets of the institutional field, such as restaurant associations and State institutional buyers.

Test Kitchen Research

The Bureau maintains a national test kitchen research facility at College

Park, Md. The research program at this facility is developing new and improved fish and shellfish cookery recipes for institutional and household application and is promoting the nutritional and dietary aspects of cooked fishery products.

Consumer Education

Increased emphasis has recently been placed on consumer education. Bureau plans provide for better consumer understanding through the production and greater use of such educational aids as recipe booklets, motion pictures, fish cookery demonstrations, seafood merchandising and quality workshops for retailers, public service radio and television announcements, fishery exhibits, and nutritional and dietary information.

Special Marketing Programs

As a consumer stimulant, coordination of cooperative industry-Government promotional programs with allied industries and national trade associations has been increased. Examples of such coordination are the annual "Fish 'n' Seafood Parade," "Lenten Fish and Seafood Time," and similar programs. Special market promotions in cooperation with the fishing industry also have proven extremely successful in correcting distressed marketing situations with which the industry could not cope. In the future the Bureau will anticipate and plan for special joint market promotions before serious situations develop.

Underutilized Resources

Still another field that requires attention is the development of underutilized fishery resources. The Bureau's program to develop markets for the underutilized fishes of the Great Lakes has demonstrated that new uses can be found for species which have lost their regular market outlets or those which have never been utilized. Increasing construction of impoundments along river systems is making potential fishery resources available to many previously non-fish-producing sections. Rice farmers have found it feasible to raise fish in flooded rice paddies. All this potential production will remain underutilized unless marketing programs are undertaken. Abundant marine resources, such as Pacific jack mackerel and ocean perch, Atlantic mullet, and hake, are not fished to their full potential because the public is not familiar with their food value. Pilot studies have shown the practicability of market extension; now it is imperative that we attack the problem nationally. The Bureau's goal is maximum economic utilization of our fishery resources; this is one way in which we can approach this goal.

Consumption Patterns

Until recently little was known about the distribution pattern of fishery products in the United States. Within the past few years much useful information on eating habits in various areas has been gathered through market research studies. These investigations include rates of consumption in principal cities and rural areas, and the species and types of products consumed. With this information, the fishing industry and the Bureau will have a guide to distribution and sale of fishery products such as is currently available to competing products. Thus, the fishing industry will be able to ship its products direct to the more promising marketing areas and reduce transportation and merchandising costs so that a wide variety of fishery products can be made available to consumers at attractive prices. These investigations should be expanded to provide broader and continuing information in this important field of marketing.

ECONOMIC RESEARCH AND SERVICES

The earlier references in this report to economic problems of the fishing industry, such as competition with foreign fishery products and other domestically produced foods, the distribution and consumption of fishery products, and productivity and production costs, establish the need for economic research and services.

Basic Economic Research

Just as in the other areas of science, the economist must have at his command the product of extensive research if he is to apply his skill to the present or future problems. Economic research with respect to general aspects of the economy, such as employment, finance, consumption expenditures, and other aspects, will be helpful. In addition, basic economic research directly concerned with the fisheries will be needed.

Economic Services

In addition to the conduct of basic economic research, the Bureau will continue to be called upon to provide economic data and information to the fishery industry, Congressional committees, other Government agencies, and the general public. Information on trends in production, distribution, consumption, prices paid for articles used in production, prices received, and other indexes of economic conditions in the industry will be made available to aid in clarifying certain economic aspects of the industry. Such information is also useful at international conferences called to consider fishery economic problems of an international character.

Transportation Studies

There are two phases of economics work in which the Bureau has a special mandate. One of these is transportation of fishery products, particularly with respect to the matter of services and rates. A Bureau of the Budget determination (23 FR 2304, 3/22/58) gave the Bureau authority to assist the fishing industry in the "improvement of transportation facilities and rates for fish and shellfish and any products thereof." Studies of volume of fishery products transported by various carriers, facilities and service offered, rates and charges, and other matters related to transportation problems of the industry will aid the Department in implementing this authority through necessary presentations before transportation regulatory agencies.

Fishermen's Cooperative Association

The other special mandate is in the field of cooperative marketing associations among fishermen. In order to comply fully with the Fishery Cooperative Marketing Act of 1934, which lodges certain responsibilities in the Department of the Interior, the Bureau will improve its work with fishery cooperative marketing associations. In addition to reviewing compliance with established regulations, the Bureau will provide consulting services on organizational procedures and structures, finance, accounting, taxation, cooperative marketing, and allied problems. At present approximately 100 cooperative marketing associations have been formed to aid small fish producers who, in many instances, are widely scattered geographically.

Types of Economic Studies

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the products, can be assembled either through general studies covering the chain of events in production, processing, and marketing, or by studies of individual steps in the procedure, such as filleting or transportation. Taxes should be studied, for their incidence is felt in varying degrees throughout the industry. Price analysis is an important field of research which we must explore from time to time. A better understanding of price making forces would be helpful to many sections of the industry in determining more exactly how changes in prices affect the sale of fishery products. Another phase which can be dealt with is current on-the-spot appraisal of economic conditions in major segments of the industry. In order that the Bureau can always be in a position to sense any impending economic difficulties and make suggestions to counteract such difficulties, either continuing studies or periodic economic situation reports should be made.

As market competition intensifies, economic studies by industry and Government will be necessary to provide long range forecasts on production and market conditions at home and in foreign countries.

Competition--
Foreign and
Domestic

Analyses of the potential production of our domestic industry and foreign fisheries are needed. Some progress has been made in fishery economic research but the scope of our programs has not been sufficient to establish clearly those factors affecting the economic well-being of the fishing industry. Intensified studies are needed not only on the competitive status of the industry with respect to foreign producers but also on competition between the industry's products and other domestically produced food and industrial products.

Since foreign production and marketing have a direct bearing on domestic affairs, foreign and domestic economic studies are planned. Studies will be undertaken on foreign costs of production of fishery products that compete with domestic products, effects of imports and exports of fishery products on our economy, and other allied subjects.

A knowledge of this Nation's future population's needs for fishery products and how they will be supplied is important. As the population grows the pressure to harvest certain types of species particularly desired by consumers will increase, but there will also be a need to bring the previously mentioned underutilized species or resources to bear in order to supply consumption requirements. Studies of these long term requirements should be undertaken as well as study of the fundamental principles of demand, so that fishermen may be better able to respond to or influence consumer demand for the products they bring forth from the lakes, rivers, and seas.

Resources and
Consumption

STATISTICAL SERVICES

Fishery statistics provide information that makes possible more efficient industry operations, supply Federal and State agencies with facts necessary to protect and foster the fishing industry, and serve as the foundation upon which nearly all research programs are built. Strengthening these activities by covering new areas of production and new types of information with greater rapidity is part of the long range program.

General Statistics Collection and issuance of general fishery statistical information on employment in the fisheries, on the catch and its value, areas of catch, production of processed fishery commodities, cold storage holdings, and foreign trade are handled principally on a monthly and annual basis. These are some of the facts by which the need for economic, marketing, and biological research programs are gauged.

It is impossible for any person or agency to follow developments or trends in the fisheries without adequate statistics. The industry is widely scattered, extending over one hundred thousand miles of coastline and interior waters. A large portion of the catch of over 200 species is taken by independent fishermen and sold through small dealers who have little contact with other segments of the industry. To meet the demands for statistics, it is proposed to expand publication of data on monthly landings of fishery products and to use more automatic data processing equipment to increase the speed with which data are handled and published.

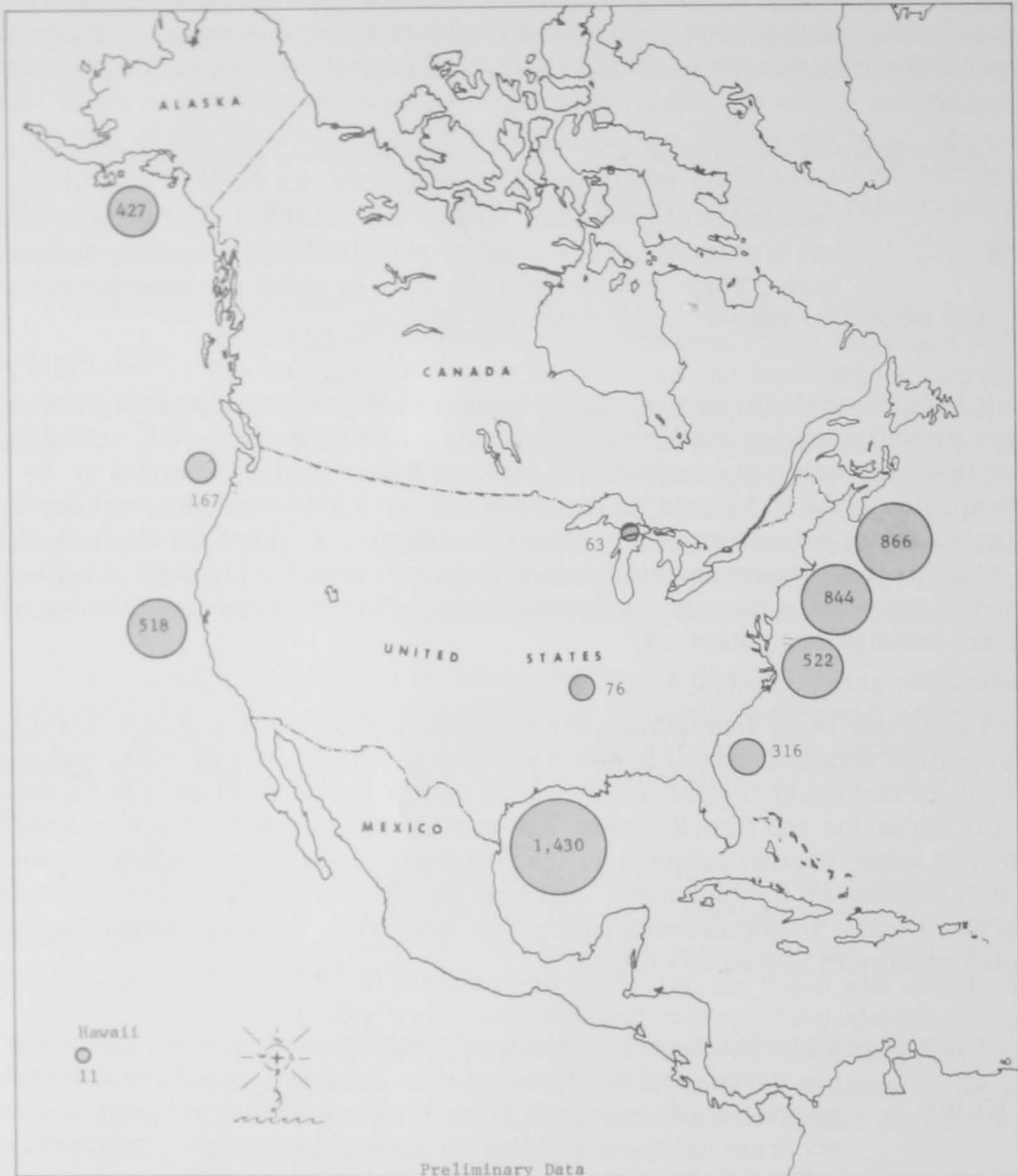
To provide basic information for future biological fishery investigations, it is proposed to collect detailed operating unit and catch statistics for important fisheries not yet subject to biological investigations. More detailed records of area of capture will be obtained in estuarine and interior waters to provide information for use in determining the effect of water control projects on the fisheries. Since an increasing portion of the U.S. catch is taken on the high seas, data will be obtained on the exact area in which fish are taken to assist in determining policy with respect to fisheries on the high seas and to ensure maximum sustained yields.

Market News Service The Fishery Market News Service is in effect the "eyes, ears, and voice" of the fishery and allied industries. It helps to stabilize markets by providing all segments, fisherman to retailer, with current and accurate daily information on landings, supplies, movement, distribution, demand, prices, and other factors affecting day-to-day marketing of fishery products and byproducts. Such services can be supplied only by Government. The dissemination of daily information places producers and marketers of fishery products on a more nearly equal bargaining basis. Fishermen and dealers can distribute their products to avoid market gluts and seek out the most favorable markets; buyers and sellers can check prices. Timely market information is distributed by mail, telephone, telegraph, newspapers, radio, and personal contact, and (1) encourages orderly marketing; (2) aids in determining past, present, and future developments on price, production, transportation, storage, and foreign trade; and (3) provides accurate price series for the industry's financial needs and for economic statistical and long and short range marketing studies. Coverage is planned of additional fishery commodities, markets, and areas.

UNITED STATES CATCH

UNITED STATES CATCH BY AREAS, 1962

(Figures represent million pounds)



The United States catch (shown in millions of pounds for 1962) is taken in both oceans and in interior waters.

In addition to publishing annual preliminary and final statistics on the fisheries of the United States, annual and monthly summaries of landings in 21 coastal and Great Lakes States are issued. The industry is thus informed of the total catch and value of fish and shellfish by regions, waters, States, method of capture, and by species. Bulletins are also issued on manufactured fishery products and industrial products, on cold storage receipts and holdings, and on imports and exports of fishery products.

EDUCATIONAL AIDS

Need for Educational Facilities Other countries have long recognized the need for trained fishery personnel and have provided adequate educational facilities. In this country the only program available is at the vocational training level, under the direction of the Department of Health, Education, and Welfare.

Objective of the Program The Bureau's supplementary program would develop trained personnel for employment in industry, in the educational field, and in State and Federal Government agencies. This program could be of great value to industry, particularly in such positions as management specialists, biologists, food technologists, and product quality supervisors. The U.S. Government now has extensive programs to train teachers and professors in the field of science. The Office of Education and the National Science Foundation are particularly active in this field. Government programs in the field of training science teachers and supporting graduate science students now total close to \$70 million per year. There is still need, however, for instruction at the local level in the particular specialties that are pertinent to the needs of the fishing industry.

The role of the Bureau in the field of education is largely that of a coordinator of training programs in the universities to which grants are made. The Bureau determines rules and guidelines, determines the basis on which grants are made and the size of individual grants, and reviews and appraises the results.

Supplementary Extension and Consulting Activities An expanded extension and consulting program would supplement academic training and provide a much needed link between the public, the industry, and the Government. This program would make possible quick dissemination of the results of research and facilitate early application, by those interested, for conservation or other public benefit. Conversely, it would provide a means whereby problems could quickly be brought to the attention of Federal and State agencies and other interested organizations. Much technical knowledge already is available, which, if aggressively channeled to the proper groups, would be a genuine aid in achieving improved processing, fuller utilization, and more profitable marketing of fishery products.

To strengthen the reserves of trained workers in scarcity categories, particularly oceanography, the Bureau of Commercial Fisheries has produced a recruiting film strip called "Deep Frontier." This film strip (with synchronized narration) gives an introduction to and a history of oceanography, describes the general areas of oceanographic research, and shows examples of both present and future techniques for oceanographic work. It concludes with a brief view of the many areas of interest encompassed by oceanography and an appeal to students to seek a career in these scientific disciplines.

INTERNATIONAL ACTIVITIES

Foreign Policy Development

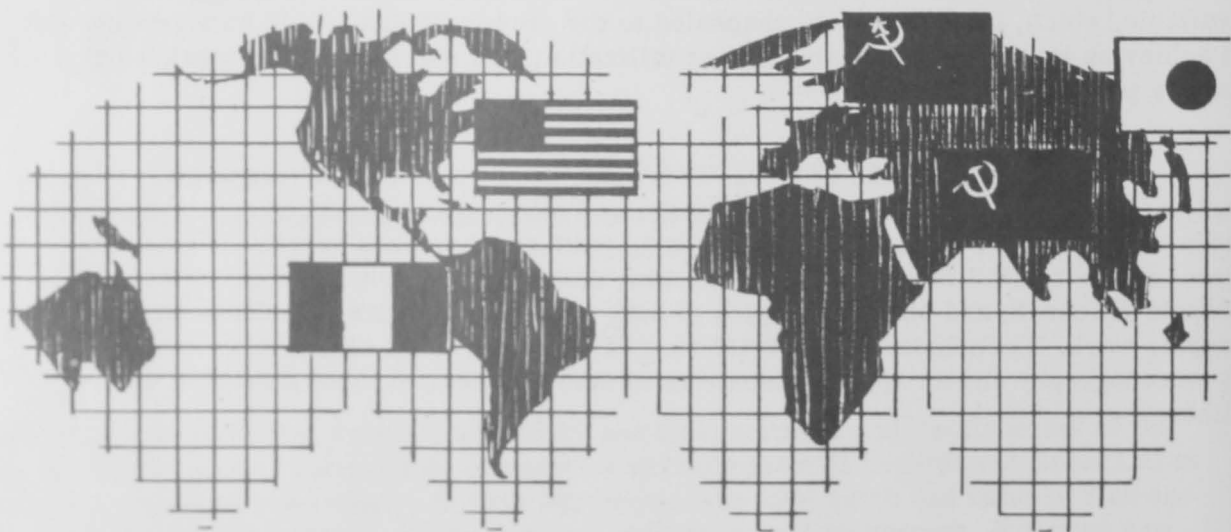
Foreign fishery policy has its origins both in domestic policy and in the relations and obligations of the United States to other nations. In the formulation of foreign fishing policy, the Department of State must rely heavily on the Department of the Interior for technical advice and assistance, and the two Departments must coordinate closely in the formulation of such policy. Interior is the Department of the Federal Government responsible for assisting the U.S. fishing industry in the national interest. If Interior is to effectively play its role in the formulation of objectives and the development of policy, it must have access to information about the operations of foreign nations in the fishery field. This Bureau must obtain timely and adequate information on the condition of resources, activities of foreign fishing industries, and political, economic, and trade conditions abroad through the Department of State, as well as similar information at home if it is adequately to carry out its tasks in this field.

Operational Functions

To obtain maximum value from information gathered by attaches abroad and from that collected by the Bureau's Foreign Reporting Service in Washington, D.C., there must be ample provision to analyze their reports to identify trend patterns in relation to tariffs, to study production costs of foreign fishery products which compete with domestic products, to observe trends in foreign fishery market developments, to evaluate technical advances, and to disseminate this information swiftly and accurately to our fishing industry and others interested in the fisheries.

Law of the Sea

Federal legislation will be required to implement the Convention on Fishing and the Conservation of the Living Resources of the High Seas, formulated at the United Nations Conference on the Law of the Sea, Geneva, March-April 1958, and signed on behalf of the United States on September 15, 1958. The Convention was ratified by the President on March 24, 1961; however, only 12 of the 22 nations necessary to bring the Convention into force have as yet ratified the Convention.



UNITED ATTACK

Team Organization

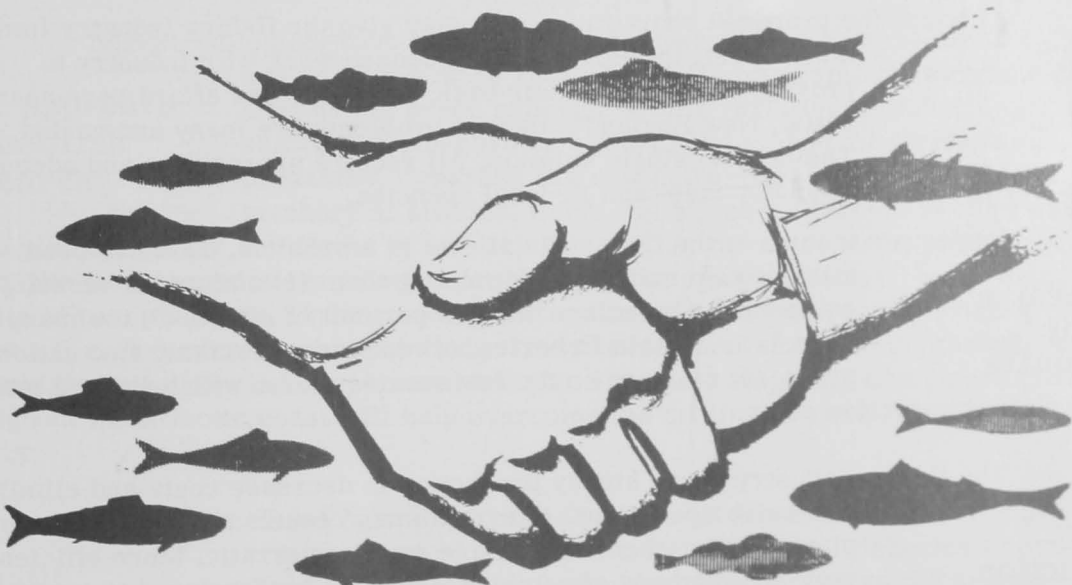
The Bureau's many-sided problem must be attacked on many fronts by many methods. The Bureau proposes to do this with a number of specialized teams, each organized, staffed, and equipped for the kind of work most effective on its front. The teams are necessarily organized in regions, divisions, branches, and sections according to the kind of problem and the kind of specialized training and tools needed. But all have a common objective and their activities must converge on that objective.

Service-wide Cooperation

In respect to activities between Bureaus within the Fish and Wildlife Service, the Bureau of Commercial Fisheries has carefully studied the requirements for a unified attack on problems involving fishery resources of interest to commercial and sport fisheries. The Bureau has developed guidelines which will assure effective use of opportunities for cooperative effort and provide insurance against the hazards of duplication or conflict.

Interagency Cooperation

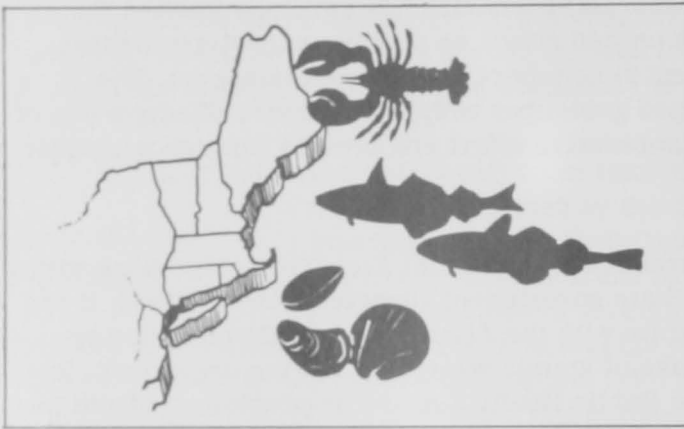
In performing its work the Bureau of Commercial Fisheries cooperates with many Federal and State government agencies. For instance, it has a cooperative program with the Atomic Energy Commission to investigate the intake of atomic wastes by marine organisms. It cooperates with the Public Health Service on problems related to pollution and sanitation in shellfish beds. It is working with the Department of Agriculture to find means of alleviating the damage to fish from poisonous insecticides. It has long had cooperation with the Corps of Engineers and the Bureau of Reclamation to find means of protecting fish at dams built by these agencies.



GEOGRAPHIC PROBLEMS AND PROGRAMS

Difficulties confronting the fishing industry as a whole have been discussed, past achievements have been reviewed, and programs of nationwide application have been offered. Each geographic region has its own distinctive set of problems, created by local conditions, geographic, economic, and biological. For these reasons the Bureau of Commercial Fisheries is organized and administered on a regional basis, and it is appropriate to discuss conditions and plans in this fashion.

NEW ENGLAND STATES



New England has traditionally been recognized for its great groundfish fisheries, including cod, haddock, ocean perch, and flounders; and its inshore and offshore fisheries for sardines, lobsters, clams, and oysters; also for its scallops and industrial product species.

Crisis International fishery problems, including increasing Russian fishing effort in the North Atlantic and current trends in international trade, have pressed our New England groundfish industry to such a competitive point that its present difficulties are almost overwhelming. The situation is so acute that positive action is essential to prevent a decline into relative insignificance of many segments of this once great industry.

Root Solutions Although the proposed short range plan may give the fishing industry immediate relief, the Bureau has proposed work with industry to provide solutions to their basic problems and afford permanent relief. New England's fishery problems are many and varied. There is no single solution. All require appropriate and adequate attention by the industry and by State and Federal agencies.

Fisherman's Income Inadequate Inadequate income at the fisherman's level is a problem. This has been attributed to many causes, among them (1) antiquated vessels and equipment, (2) decline in catch per unit of effort, (3) too many vessels in certain fisheries, (4) decline or extreme fluctuation in price, (5) reliance on too few species, some with a limited market, and (6) rising production costs.

Steady Production a Goal The fishing industry needs steady production to decrease costs and eliminate expensive operational interruptions. Vessels and the processing plants suffer when catches are small or erratic. More efficient gear and methods of catching fish must be developed to increase production and reduce costs. Modern vessels for long distance fishing, and better techniques for storing and preserving quality, such as freezing fish at sea, are needed. Stabilizing the supply through development of

new resources to increase the variety and flow of fish to processors will be the goal of exploratory fishing in the Northwest Atlantic Ocean. This will involve improved design of vessels and gear for utilization of newly located resources.

Fishery Fluctuations One of the problems facing the industry is that landings of many principal species of fish and shellfish have declined or are subject to periodic and sometimes extreme fluctuations. Biological research is necessary to ascertain reasons and remedies for declines and to develop knowledge for forecasting fluctuations which affect industrial planning. Past biological research has built a firm base for more rapid future progress.

Technological Research and Marketing Use should be made of fish now being discarded at sea. Some can be used as food and others should be diverted to industrial use. However, these improvements will require research and development. Short and long range technological studies leading to quality improvement are necessary to increase the economic value of fish now being marketed in primary processed condition. Quality standards combined with voluntary Government inspection of fishery products have already led to more effective marketing. Additional standards and concentrated market research are needed to provide new and expanding outlets for conventional and newly developed products. The Bureau's market development activities will aid in the solution of this problem. Technological research has been facilitated by the construction of a modern technological laboratory for the New England area.

The Inventory Problem The New England industry is faced with periodic buildups of burdensome inventories. Among the many solutions that have been advocated are (1) expansion of markets by area and income class, (2) more current marketing information, and (3) special market promotion campaigns when oversupply conditions threaten. Marketing activities will be stepped up, and market news coverage increased to meet the needs of the industry.

New Approach to Shellfish Research Bureau biologists have been performing research on oysters for many years and on clams more recently. Their program now warrants bold attempts to breed superior oyster varieties, to launch pilot-scale, salt-water-pond oyster culture, and to control diseases and predators. Congress has now authorized an experimental shellfish hatchery at Milford, Conn., for research leading to commercial production of oysters and clams by artificial means. At the same time, sight must not be lost of the fact that solutions to many problems of the oyster industry can be found in the results of past research. Understanding and application of these results will depend on success in communicating this knowledge to oystermen and in dispelling the effects of accumulated tradition and deep-rooted beliefs. A greater emphasis on oyster cultivation throughout the Atlantic coast will help overcome the decline in yield from this important fishery.

Atlantic States Marine Fisheries Commission Each of the New England States, as well as all States along the Atlantic coast, are members of the Atlantic States Marine Fisheries Commission. Since the Bureau has been designated by law as the primary research agency of the Commission, a close working relationship exists between the two organizations. Research on shad has been successful in reaching its primary objective, and the results point

the way to restoration and management of this resource. Shad and striped bass research have been carried on for many years, and will continue on a monitorial basis. The Bureau is providing for programs, some already underway, on flounders, sea scallops, herring, and industrial fish research.

International Respon- sibilities

Continued research will measure the effects of this regulation and pursue the problem of fluctuations. Research on cod and whiting is to be expanded.

Economic Research

The declining groundfish fishery needs further economic research to assist in its rehabilitation. International competition from Canada and Japan affects the economic well-being of our scallop fishery, and this situation as well as prospective competition from new scallop beds off Florida should be analyzed. The nature of the demand for such products as soft clams, lobsters, whiting, and other species should be analyzed to determine possibilities for improving sales policies and practices, providing greater consumer satisfaction, and increasing gross income of producers of these products.

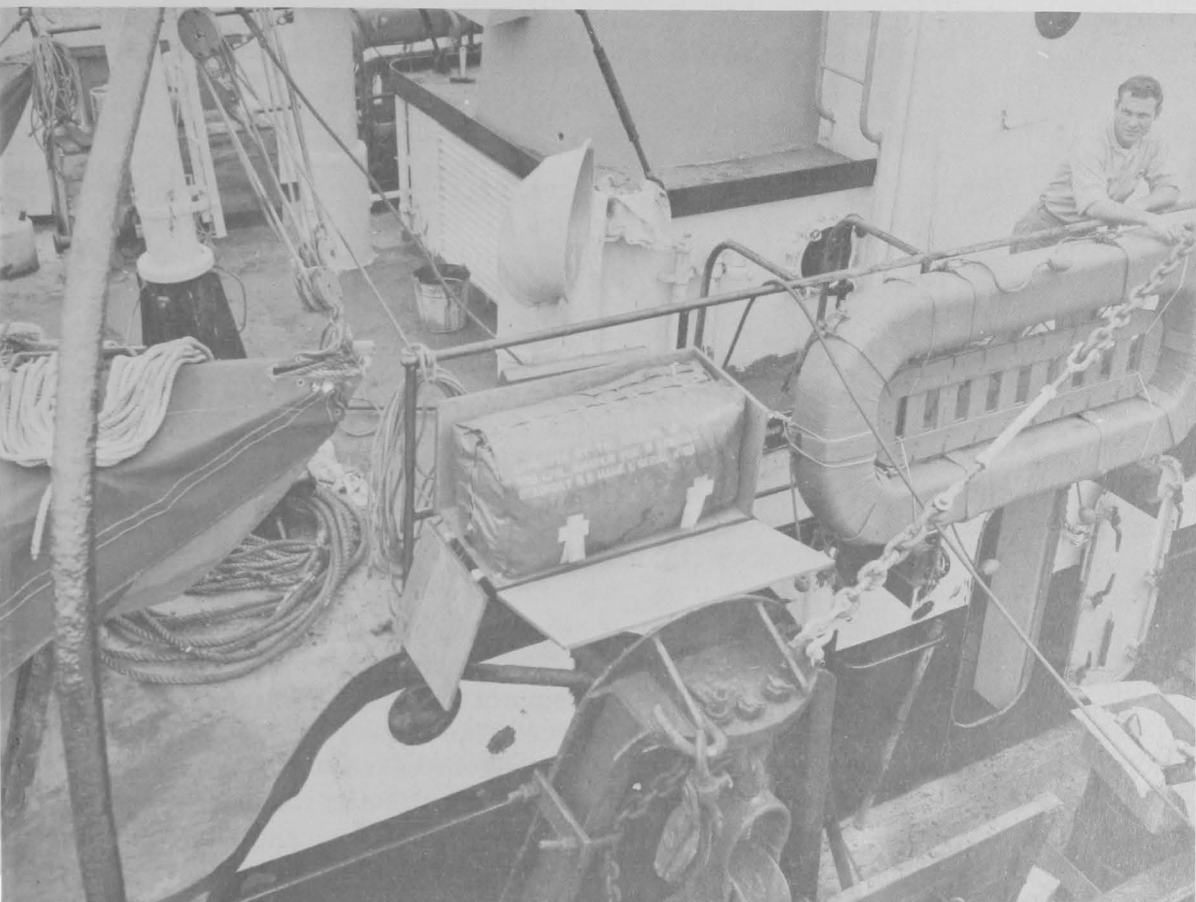
MIDDLE ATLANTIC AND CHESAPEAKE BAY STATES



The area from New York to Virginia occupies a peculiar niche in the Nation's fishery resource pattern. Its coastal waters harbor some migrants from the east and north in winter, but the really abundant fish supplies are furnished by spring and summer migrants from the south. These migrations provide a rich variety of fish species, but bring problems of seasonal and annual fluctuation in supply. A number of great estuaries support important

year-round stocks of shellfish and migrant summer fishes, and some are nursery grounds for the young of many important commercial species.

Chesapeake Bay is the largest and most productive estuary, famous for its oysters and crabs, and summer habitat for many seasonal fishes. It is the nursery ground for young of many fishes that spawn outside the mouth of the Bay but whose fry drift into the Bay for further development and growth.



High marine insurance rates add to the rising costs of production. Equipment such as conventional and inflatable life rafts are carried on the Bureau's M/V Silver Bay to demonstrate to the industry the value of modern safety devices.

The supply of some species in the Middle Atlantic and Chesapeake Bay areas has shown a rather steady decline. For instance, oyster production is less than one-fourth that of 75 years ago. Other species have been subject to extreme fluctuations: croaker production, for example, fluctuated from a high annual catch of 65 million pounds to only 3 million pounds. Because most of the major fish stocks migrate over considerable stretches of the coast, many research problems of the Middle Atlantic and Chesapeake Bay fisheries overlap those in the South Atlantic and New England areas. The menhaden fishery, the largest in North America, has its center here, although it extends northward to New England and southward into the Gulf of Mexico.

Now restricted mostly to inshore waters, current biological studies for many species have advanced beyond the life history phase. For some species, we are examining the effects of the fishery on the available stocks in order to know if downward trends can be arrested and a higher level of harvest can be maintained. The programs the Bureau is planning will advance this research more rapidly and will investigate the magnitude and causes of fluctuation from natural factors. The studies will deal with blue crab, oyster, clam, menhaden, striped bass, croaker, shad, and flounder fisheries. Estuarine habitat preservation and improvement studies are to be undertaken as they relate to these species, and offshore work will be done on menhaden. A new biological research laboratory has been constructed and is in operation in the Chesapeake Bay area.

The exploration and development of new fishing grounds, mainly in offshore areas, is to be undertaken. The harvesting of surf clam beds during recent years is a good example of the creation of tangible economic values from a latent resource. This fishery has grown rapidly during the last 15 years, and in 1961 reached a 28-million-pound production level, adding over \$1.8 million to fishermen's earnings. Shore processors likewise have benefited. There is fragmentary recent evidence that albacore and yellowfin tuna may be widely distributed near the Gulf Stream off the Middle Atlantic and Chesapeake Bay area. A program has been designed to assess this potential by exploring the area more comprehensively. It is possible that other potentials, now completely unknown, will be revealed. Development of new fishery resources tends to stabilize the supply, relieve fishing intensity on hard-pressed existing fisheries, and alleviate the fisherman's economic handicap of relying on too few species. Since most of the present fisheries are within the inshore area and fishing equipment is gaged to those needs, our program calls for extensive research for adapting gear and vessels to deeper water or midwater operations. This will be carried out from bases in the South Atlantic and New England areas.

Middle Atlantic and Chesapeake Bay products must find their outlets in the common market places, and any advance in mechanizing and modernizing to reduce costs will be an important factor in maintaining competitive status. From the standpoint of present reliance on hand labor, the blue crab and oyster industries stand to gain most from mechanized techniques. Technological advances and development of improved fishing gear for utilization of more productive grounds should reduce unit costs of production by increasing volume without much extra production effort. Great production from old or new grounds must be accompanied by studies to discover consumer preferences and develop adequate markets. Technological studies

leading to improved quality and better processing procedures are integrated with comprehensive market development in our long range plan. A modern technological laboratory is being considered for construction in this highly important Middle Atlantic and Chesepeake Bay area to replace present facilities at College Park, Md.

Retrieve a Market

A serious marketing problem is the general declining trend in fresh fish sales upon which considerable dependence has been placed by some fisheries. The demand for processed and packaged fishery products, including cooked and ready-to-serve items, is replacing that for fresh fish. This swing in consumer preference has reduced the demand for porgy, butterfish, spot, croakers, and other pan fishes. Little research has been done on this problem. The Bureau plans technological studies of new methods of processing, preserving, and attractively marketing these species and the development of grade standards to ensure that the consumer receives a high quality product. Pending the results of these efforts, there is need for market promotion to relieve glut conditions by distributing the oversupply beyond present limits of sale. Under prevailing trends it is possible that some cheaply caught and abundant species may be more valuable for industrial use than for food products.

Fish Oil and Meal Research

Fish oils and meals, principally from menhaden, are probably the most universally recognized industrial fishery products in this area. These are so important that the problems and programs relating to them have had special attention in foregoing sections on national problems. Short and long range quality and nutritional studies are planned to find new and wider markets for these products, and studies will be undertaken to identify the causes of declining prices for oil.

Economic Research

A closer examination of the economic feasibility of various types of controlled oyster production appears warranted in view of the difficulties with pests and pollution under natural conditions. The blue crab industry is beset by economic problems, particularly those attributable to the perishability of most of its products and also because of the large labor input required in processing operations. Very little is known about the intricate economic aspects of production and consumption of flounder, shorefishes (such as scup), sea trout, sea bass, and other species. In this area of heavy population, a better knowledge about consumer attitudes toward fishery products and the location and operation of distribution facilities is important.

SOUTH ATLANTIC AND GULF STATES



In recent years, the South Atlantic and Gulf area has assumed a major position in U.S. fisheries. Although once comparatively small, it now represents over one-fourth of the U.S. total. The important shrimp fishery, which has ranked first in value in domestic production in recent years, and much of the menhaden fishery, presently first in volume of catch, are located here. Mullet, red snapper, Spanish mackerel, oysters, and crabs, together

with some 50 other fishes and shellfish, also support substantial fisheries.

Shrimp Fishery

The shrimp fishery, which ranks far above any other fishery in this area in value, has grown to its place of prominence chiefly in the last decade. Once an inshore fishery, with the exception of limited grounds off the mouth of the Mississippi River, shrimp fishing has spread since 1949 to waters off the Mexican coast on the west, and to the Dry Tortugas on the east. Fishing grounds have been further extended by the operation of U.S. flag vessels off the northern coast of South America. Two new species of shrimp, browns and pinks, came into general commercial use along with the previously used white shrimp during this period of growth, and browns now lead in production.

Shrimp Fleet too Large

The sharp rise in catch immediately after 1950 was accompanied by expansion and increased efficiency of the fishing fleet. By 1955 the accumulated shrimp stocks on the virgin grounds had been removed, and annual catches now appear to have leveled off considerably below the peak yield. The fleet has continued to grow, however, while total annual landings, except for 1961, have remained fairly constant. The shrimp situation became extremely serious in the 1961 fishing season, when a substantial reduction in shrimp abundance, apparently of natural origin, reduced the catch. Relief for this situation was sought through the use of shrimp vessels in other fisheries, for example, the industrial fishery, and the extension of the fishery to more distant fishing grounds and deeper waters. Teams of Bureau specialists in exploratory fishing, gear development, technology, and marketing assisted the industry to make these changes. The shrimp catch returned to normal levels in 1962.



Trawling for industrial (scrap) fish for manufacturing into animal feed has expanded rapidly on the Gulf coast in recent years. Here is some of the fleet at Pascagoula, Miss.

Conservation of Shrimp Resource

Maintenance of the shrimp fishery at its optimum level will require a thorough understanding of the biology of shrimp: definition of the several independent stocks; time and place of spawning of each larval development; nursery grounds; rates of growth; movements and migrations; mortality; and interrelationships with other organisms. Without this knowledge it is impossible to harvest an annual crop of shrimp in the places and at the sizes that will yield the greatest return year after year, or to understand why occasional years of scarcity or unusual abundance occur. These fluctuations in abundance are caused by complex interactions between physical, chemical, and biological features of the environment. Living as they do in shallow estuarine waters, young shrimp are sensitive to weather conditions, which cause abrupt changes in temperature and salinity of the water, and changes in abundance and migrations of animals that prey upon young shrimp. At our present level of knowledge about the sea there is little we can do to eliminate these variations in abundance. But it is possible, with sufficient knowledge, to forecast periods of scarcity or great abundance, and this knowledge should be valuable to the shrimp industry. The Bureau program calls for such research, and some of it is now in progress. Facts gained from this research are also necessary in dealing with the international aspects of the shrimp resources.

Industrial Fish

Catches of menhaden in the South Atlantic and Gulf have reached new records. Despite its enormous yield, however, this fishery has been plagued by fluctuations in abundance. Research has been designed to determine causes of these fluctuations and the extent to which they are predictable. Recently declining prices and competition from foreign imports have added to the problems of the menhaden industry. Technological, marketing, and other studies are necessary to assist the industry to help combat these threats.

The manufacture of animal food products from bottomfish landed in the Gulf States has grown from a pilot-plant operation in 1953 to a firmly established industry processing landings of close to 100 million pounds annually. This rapidly expanding fishery promises to aid existing fisheries in two ways: by furnishing offseason raw material and employment to the established menhaden fishery and by providing a means of utilizing the excess fishing capacity of the shrimp fleet. Studies have been planned to observe and measure the effects of this fishery on the populations of fish and other marine forms in or near the fished areas.

Estuarine Studies

One of the most important problems confronting the Bureau is the effects of engineering projects, land development, and reclamation on vast estuarine areas of the Atlantic and Gulf coasts. These are the nursery grounds for many of the major species, including the valuable menhaden, shrimp, and oysters. It is essential that the effects of changes in the environment be assessed so that proper precautions can be taken to minimize the adverse effects that future engineering projects may have on our fishery resources.

Effects of Nature and Man

State and Federal agencies generally agree that there is need for a research program to provide greater knowledge concerning the reactions of shellfish, fin-fish, and waterfowl resources to changes in salinity, temperature, sedimentation, pollution, and other factors introduced by manmade changes. The need for such knowledge has been recognized by the Atlantic and Gulf States Marine Fisheries Com-

missions. A research program to fit the needs of the many agencies and groups interested in estuarine changes is getting underway and should be expanded as soon as possible.

Exploratory Fishing Exploratory fishing in the Gulf of Mexico has successfully opened new grounds for shrimp fishing, demonstrated the availability of tuna throughout the year, and improved methods for capture of red snappers and industrial fish. Large schools of herringlike fish have been located in mid-water depths of the Gulf, and methods for capturing them are under study. Long range programs to determine the commercial potential of other known resources of the South Atlantic and Gulf have been adopted. The use of modern electronic equipment holds great promise of success, not only to open the door to neglected resources but to improve the efficiency of currently used fishing gear. This work will be facilitated by early replacement of the exploratory vessel Oregon and strengthening of the program based on the South Atlantic coast.

Foreign Competition and Loss of Markets Shrimp is a popular fishery product in the United States, and marketing conditions have been generally favorable. The rate of consumption has increased steadily, although after 1954 the domestic catch remained level until the sharp drop in 1961. As a result, foreign production, which had been entering this country at an increasing rate, is supplying a larger and larger proportion of our domestic consumption. Imports have tripled since 1954, and in 1962 were a record 141 million pounds.

The potential supply of shrimp from foreign sources is very large. Available information on developments abroad shows a rapid expansion of shrimp production in many countries. The large influx of imports in 1961 exceeded domestic production for the first time.

The general decline in demand for southern species of fish other than shrimp, and consequent periodic surpluses, fundamentally stem from changes in general fishery marketing patterns with which the South Atlantic and Gulf areas, in most instances, have not kept pace. The market is expanding for processed and packaged products, including those cooked and ready to serve, which facilitate consumer use. Nothing less than a broad change in methods of preparation and marketing of southern fishery products will overcome the difficulties. Fresh fish such as Spanish mackerel, mullet, bluefish, and red snapper simply cannot remain in a strong market position when shipped essentially in the form in which they come from the water. A broad program of technological research is planned to improve existing fishery products and develop new types of products, with strong emphasis on quality standards for both. Our voluntary inspection and certification program, as it grows, will ensure reaching product quality objectives.

Transportation Studies Recent economic difficulties of the menhaden industry point up the importance of transportation costs for shipping fish meal to buyers. Often transportation costs are 20 percent or more of the selling price. The industry is cognizant of the need to watch this cost and is alert to every opportunity to reduce it. Bureau transportation specialists, through study and development of detailed transportation information, should work with the menhaden industry and transportation firms to arrive at the most economical arrangements for shipping fish meal to feed-mixing firms located in inland States.



Landings of Atlantic menhaden exceed those of any other U.S. fishery. This fishery, which produces meal and oil, has suffered from foreign competition.



The shrimp fleet of the South Atlantic and the Gulf of Mexico lands this country's most valuable ocean harvest. The fleet has expanded rapidly in recent years.

General

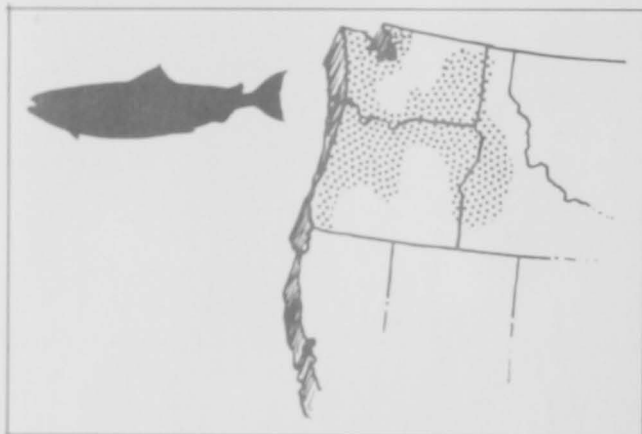
In addition to the major programs detailed here for the South Atlantic and Gulf States, this region shares with the rest of the Nation a number of problems which are to be attacked in our short range and long range programs. Of prime importance is the construction of a radiobiological laboratory at Beaufort, N.C., to house the staff now working on various aspects of peacetime use of nuclear energy and its effects on commercial fisheries. Important also is the establishment, staffing, and financing of a permanent exploratory fishing station on the South Atlantic coast. Preliminary exploratory work in this area has already demonstrated the existence of potentially valuable commercial resources.

Replacement of exploratory vessels for use in the Gulf and Caribbean will be necessary if existing programs are to be carried out. Extensive repairs to the Galveston laboratory are completed, and construction of a new laboratory building to replace the antiquated structures at Gulf Breeze is being considered so that biological research on the important species of commercial fish and shellfish in the Gulf area, and the environment in which they live, can be carried out effectively and efficiently.

State Cooperation

Close cooperation in planning is maintained with the Gulf States and Atlantic States Marine Fisheries Commissions for which the Bureau, by law, is the primary research agency. Cooperation with individual States has been mutually valuable, particularly in the field of statistics.

THE PACIFIC NORTHWEST STATES



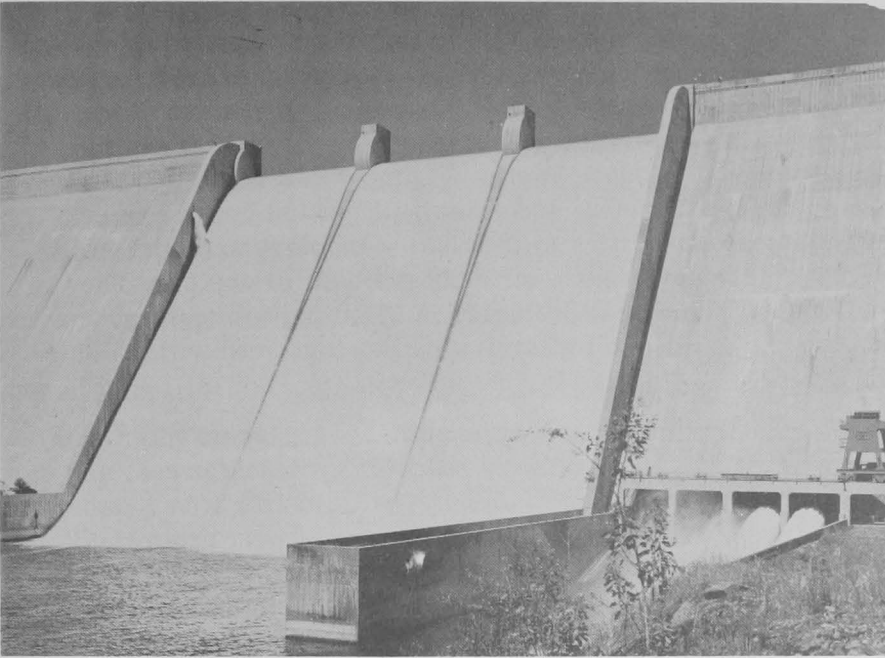
The fishery resources of Oregon and Washington have been of great historical importance in the development of the Northwest. Even with today's great industrial growth, fisheries continue to be a leading industry, with landings usually worth about \$25 million each year. The Northwest fisheries, however, are not without problems, one of the most important of which is the ever-increasing threat to salmon from multiple purpose dams.

Northwest Fishery Problems

Federal and private Columbia River dams now hinder passage of upstream and downstream migrant salmon. More and larger dams are planned or under construction. Future salmon runs are in great jeopardy, especially in the upper reaches of the system. Some progress has been made in passing adult salmon upstream, but the safe passage of young on their migration to the sea has not been solved.

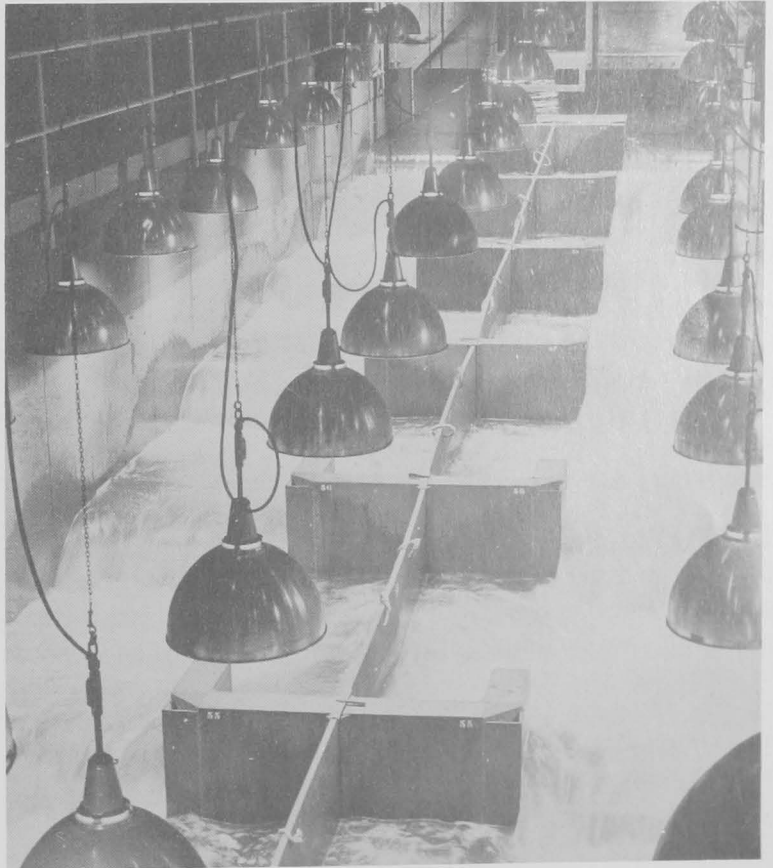
State Responsibility

Much of the fisheries research of the fisheries of Oregon and Washington, as in California, is performed by the States. The States are solely responsible for management of all fisheries in territorial waters except those under control of international commissions. Where joint effort is needed for the coastal fisheries of these States, research is coordinated by the Pacific Marine Fisheries Commission.



Western dams have threatened and destroyed numerous salmon runs. This barrier was built without fishways.

An experimental fishway laboratory has been erected at the Bonneville Dam on the Columbia River. Research there is beginning to pay off in better salmon protection at less cost. Many problems are still being studied.



Bureau Responsi- bility

The Bureau's most critical responsibilities are to maintain the valuable salmon runs in the face of Federal and private water projects and to discharge responsibilities in connection with international conventions (Annex X) shared by the States. In addition, the Bureau is planning and carrying on broad ocean research projects in the off-shore waters of the North Pacific Ocean. If additional species are put under international control, our enforcement activities will need to be increased proportionately. The Bureau has responsibilities to the fishing industry to assist in locating new fishery resources and developing more efficient methods of capture. The Bureau will also assist in solving technological problems in handling, processing, and marketing products where these problems are industry wide in scope, and will provide basic chemical and nutritional research findings for use by industry.

Dams and Fish

Dams affect salmon runs by hindering upstream and downstream migration, by changing water temperatures, reducing spawning areas, and otherwise changing the environment. The Columbia River fisheries development program is a cooperative management program of fishery agencies of Washington, Oregon, Idaho, and both Bureaus of the Fish and Wildlife Service, financed by the Government. It aims to mitigate the collective harmful effects of dam construction in the Columbia system by clearing streams, laddering obstacles, constructing and operating hatcheries, screening irrigation diversions, and carrying on similar activities. Additionally, studies are underway to test the efficiency and practicability of artificial spawning channels and natural and seminatural rearing ponds.

Coordination Essential

The development program is a segment of the whole Columbia River fishery program, which consists of research and management to maintain salmon populations. The activities extend from the ocean to the upper migration limits on the main Columbia River, the Snake River, and their tributaries. There is substantial participation by this Bureau, by the Bureau of Sport Fisheries and Wildlife, and by States, with directly appropriated funds, and with allocations from the Corps of Engineers and from private power companies. The complex of activities in the Columbia River Basin involves many groups with varied and sometimes conflicting interests. A Bureau Program Office for Columbia Fisheries was established in early 1958 to assist in direct coordination of basin activities.

Progress has been Made

Efforts have been made to find satisfactory solutions to problems of passing upstream and downstream migrant salmon safely around dams and solutions to other major salmon fishery problems. Findings on salmon behavior in fishways gained from studies at the new fish facility laboratory at Bonneville Dam promise at least partial solutions of fish passage problems. Guiding of young salmon by electrical fields in the water has been developed to the point where it is over 90 percent effective under certain water conditions. Federal and State hatcheries and stream improvement are helping to offset loss of natural spawning areas resulting from the accelerated dam building program. In the upper reaches of the basin, with its higher dams, the situation is critical. Here, and in the lower basin, changes in habitat and environment brought about by dams, coupled with fishing pressures and pollution damage, are of major concern. The Bureau's program provides for increased effort in research and management activities.

Accelerated Action

In response to problems created by proposals to erect dams as high as 700 feet on the Snake River, Secretary Udall directed initiation of a "crash" fish passage research program. This program is seeking to discover by 1964 the direction in which a sound program of river and fishery development should proceed. This will entail extensive experiments in the Columbia River Basin to develop new types of fish protective devices and to determine the reaction of salmon to rivers altered by power reservoirs.

New Marine Resources

Explorations of latent marine resources in waters of the Pacific Northwest should be expanded to assist the fishing industry to develop local fisheries. Definition of the types, distribution, and abundance of fishes and shellfish not now utilized in the area will assist the industry in appraising the potential value and availability of unutilized resources and aid in developing diversified fisheries. Past explorations for shrimp off the coasts of Washington and Oregon have led to a substantial fishery. Although these shrimp surveys of the two States are now considered complete, continued explorations should be made in international waters off the west coast of Vancouver Island.

Studies of the pelagic resources of the open ocean off this area should be initiated to provide information on untapped resources there. Explorations for stocks of bottomfish and shellfish in waters deeper than those presently fished should be intensified.

Oysters

The Pacific oyster industry, which farms privately owned or leased grounds, produced 16 percent of the Nation's oysters in 1961. These Pacific oysters are raised from imported Japanese seed or from seed locally set during warm summers. Aside from present marketing difficulties, the most serious problems of the Pacific oyster industry are pollution and predation by introduced oyster drills. Encouraging results are being obtained from research by the Bureau on the Atlantic coast and by the State of Washington. Drill-control research especially shows promise. Oyster studies by the Federal Government are not contemplated for this area, but accelerated fundamental research in laboratories on the east and Gulf coasts has indirectly aided and strengthened the Pacific oyster industry.

Technology

Basic technological research on Pacific Northwest fishes will be expanded and diversified in order to yield greater income to the fishery per unit of production. This would help processors to preserve the sea-fresh quality of fishery products, to use efficiently the unutilized and underutilized species, to make more profitable use of byproducts and to provide information on nutritive value to bolster markets. The major fishes of the Pacific Northwest such as salmon contain highly unstable oils the principal limiting factor in successful preservation. Research will be conducted on the chemical changes in oils and flavors to provide a basis for better preservation of fish and fuller utilization of waste products. Development of grade standards will be extended to additional fishery products and the Government voluntary inspection and certification program expanded to assist industry to improve its product and its sales. Standards have already been developed for frozen halibut and salmon steaks and a Government inspection program is operating in Seattle and Bellingham, Wash. Some species such as hake and dogfish are pests on the offshore fishing grounds. Means must be found to utilize these now unwanted species.

Marketing

Marketing services to the Pacific Northwest and Alaska fishing industry will be expanded to assist the industry in combating dwindling markets for certain species and in expanding markets for oversupplies of others. The present and potential production of many species is greater than existing markets can readily absorb. Markets for the newly developed shrimp fishery in the Pacific Northwest and Alaska, for bottomfishes, for Pacific coast oysters, and for halibut must be expeditiously expanded. Planned market development and consumer education activities, utilizing regional marketing services and those of marketing specialists strategically located in and adjacent to the major market centers throughout the United States, will assist the industry in solving these problems. Further, to assist the industry in maintaining orderly marketing practices, current marketing reports will be improved.

Gear Research

High costs of labor in the United States have placed fishermen at a disadvantage in competing for world markets. Maintaining these high labor rates and reducing the cost of raw materials can be achieved only through development of more efficient catching techniques. Improvement of current fishing gear and development of new methods for capturing fish should be accelerated so that the technology of American fishing is equal to or better than that of other countries.

Economic Studies

The changing population distribution on the west coast necessitates a flexible approach to fishery and food problems. The limited number of abundant species, and the national distribution of the major products such as salmon, halibut, and canned salmon as well as king crab has resulted in a complex system of inter-regional exchanges. Drastic changes in abundance of sardines, mackerel, and salmon have resulted in economic difficulties for whole sections of the fishing industry. Moreover, some of the fisheries, such as those for salmon and halibut, rest on a fabric of regulation which perforce is limited and may require severe alteration at any time. Thus there is a need for continuing evaluation of the situation by economists, so that industry and Government can cope with the problems that continually crop up.

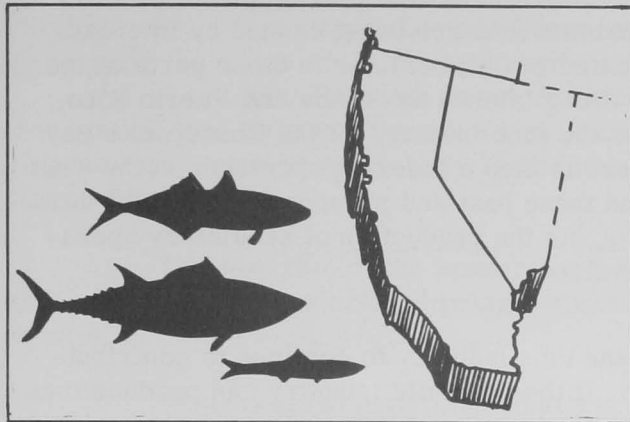
In some of the fisheries of this area there is an oversupply of vessels and gear, so that the average catch and earnings are low. This is a problem that needs solution, and solutions for this type of difficulty have been hard to find.

This also is an area of considerable union activity. Hence, there should be an active program of research in labor economics, as the problems arising in this field are numerous.

High Seas Fisheries

Fluctuations in high seas fisheries, such as albacore, in the Pacific Northwest, are caused by influences largely unknown. It is not possible at present to predict with any degree of certainty the survival rate of most valuable commercial species in the sea. There is, indeed, very little knowledge of the influence of temperature changes, currents, and other oceanographic factors on the abundance of fishery resources. Studies of the oceanography of this area, marine habitat studies in adjacent waters of Alaska, and oceanographic work along the Pacific coast and in the Central Pacific will help us to predict fishing success, harvest Pacific marine resources efficiently, and locate new fish stocks.

Accelerated research and services have been planned to assist the Northwest fishing industry to reach high levels of stabilized production. Biological and technological laboratory facilities are overcrowded. This will be alleviated by construction of a new laboratory in Seattle which is now underway.



Leading Fishery State

Fishery problems in the Pacific Southwest are interrelated and differ markedly from those of other regions. California

frequently leads all other States in total volume and value of fish caught. In 1961 it produced 598 million pounds valued at \$56 million, 12 percent by volume and 15 percent by value of the total commercial catch of the United States. The commercial

fisheries of California are characterized by the great importance of offshore surface-schooling fishes, of which tunas are the most important. In addition, there are very substantial fisheries for other surface-schooling fishes such as sardines, Pacific mackerel, jack mackerel, and anchovies. Smaller fisheries exist for bottomfishes such as flounders and rockfishes, anadromous salmon, and shellfish such as crabs, shrimp, abalone, oysters, and clams.

California's tuna industry has become one of the most important fisheries in the United States. It now yields about 150,000 tons annually, primarily yellowfin and skipjack. Lesser amounts of albacore and bluefin tuna are also landed in Pacific coast ports. The tropical fishery for yellowfin and skipjack extends from southern California southward on the high seas off Mexico, Central and South America to northern Chile. Bluefin are taken off Baja California and southern California, and the albacore fishery occurs not only off the entire State but off Baja California and the Pacific Northwest States as well.

The Tuna Fishery

Yellowfin and skipjack tunas yield four-fifths of the American tuna catch. Conservation study is provided under the Inter-American Tropical Tuna Commission. Albacore and bluefin tuna, temperate zone species, are under study by the California Department of Fish and Game. Both species appear seasonally off the southern California and northern Baja California coasts in variable abundance. The Inter-American Tropical Tuna Commission concluded in early 1961 that the yellowfin tuna stocks of the eastern tropical Pacific Ocean were being fished at, or perhaps somewhat beyond, the level of maximum sustainable yield. Consequently, the Commission has recommended that a quota be placed on the catch. Legislation in Congress will permit the U.S. Government to regulate the catch, and the Bureau is developing methods to enforce the regulations. In its research program, the Bureau must utilize its developing knowledge of the habits and behavior of tuna to recommend ways in which the industry can reduce the cost of catching and processing tuna.

Conserving the Tuna Resource

A major problem confronting the tuna fishing industry is the importation of frozen and canned tuna from Japan. Imports of frozen tuna in 1948 amounted to 4,500 tons, 3 percent of the domestic catch. In 1962, by contrast, imports of fresh and frozen tuna amounted to 162,000 tons, round weight basis, or 104 percent of the domestic catch of the 50 States. Imports of canned tuna, mainly from Japan, have also increased, although not to such an extent. There is a duty on canned, but not on frozen, tuna.

Tuna Imports

Tuna Industry Decentralization

The tuna industry presents a problem for the region, in that operations are being decentralized, which will remove a portion of the industry to distant areas. At the moment tuna are being canned by interests that were originally located in California or in other parts of the west coast, in such far-flung islands as Samoa and Puerto Rico, and in a spot as alien to the tuna industry as the Chesapeake Bay shore of Maryland. There is also a freezing operation on the west coast of Africa. The economic realities behind these past and prospective shifts of location should be examined. Not only tuna canning, but the production of subsidiary operations involving oil, meal, and pet food, are involved.

Aids to Tuna Industry

There are several ways to assist the tuna industry to continue to contribute to the national economy. If the domestic industry can produce tuna as cheaply as the Japanese, or at less cost, then American processors will increase their purchases of tuna caught by American boats. In order that tuna may be produced domestically at less cost, vessels must be cheaper to build and operate, and designed for greater speed and cruising range. Insurance and repair costs must be cut, and aid in financing construction made available. Assistance in these directions is planned by the Bureau as outlined in Part I of this report. There has been a change in the major method of fishing from bait boats to the use of power blocks and nylon nets. These changes have reduced the cost of fishing and have proved a very successful development. Late in 1959, purse seine vessels, many that were converted from bait boats, caught tuna in quantities and at costs which were competitive with Japanese imports. These developments instilled confidence in vessel operators and led to substantial investments in fleet modernization. Nevertheless, these increases in efficiency have hastened the onset of overfishing of yellowfin tunas; and as the fishermen's skill in catching skipjack improves, the danger of overfishing this species will increase.

Tuna behavior studies will elucidate patterns of feeding and movements, which will assist in improving fishing methods. Operations research will help develop an optimum fishing strategy. Research in these fields has begun, but sharp acceleration of the program is desirable.

New technological studies are planned to improve the preservation and handling of raw fish. This will enhance quality and reduce losses to the industry caused by deterioration in the period between capture and canning. This phase of the program will be facilitated later by construction of a technological laboratory, or by providing equivalent facilities in other ways. Byproducts development, marketing, statistical, and rapid informational services are planned, including foreign reporting; economic studies of trends abroad and at home will be continued.

Sardine Fishery Erratic

The sardine fishery was formerly the largest single fishery in the United States. The annual catch averaged nearly 550,000 tons from 1933 to 1944, but declined rapidly after World War II, first in the Pacific Northwest, then in central California. The catch in southern California has been very erratic, ranging from about 350,000 tons to about 4,700 tons. During the 1962 season this species produced a total catch of only 7,700 tons.

Sardine Research

As a result of this decline and consequent hardship in the industry, a greatly expanded cooperative research program was started. It was called the California Cooperative Oceanic Fisheries Investigation, and included, in addition to the Bureau, the California Department of Fish and Game, Scripps Institution of Oceanography, Hopkins Marine Station, and California Academy of Sciences. Some of the costs of this expanded program have been borne directly by the industry through the California Marine Research Committee.

The program of the research agencies has yielded results that make the sardine one of the best understood pelagic species in the world. But important problems remain.

Several spawning grounds have been defined by the postwar research program. An essential point in understanding the population dynamics of the sardine is the characterization of the stocks which contribute to these spawning areas. This is now being attacked, with some success, by a modest study of hereditary traits of sardines, revealed through differences in blood groups. A large-scale tagging experiment has been designed, which should give direct and conclusive results.

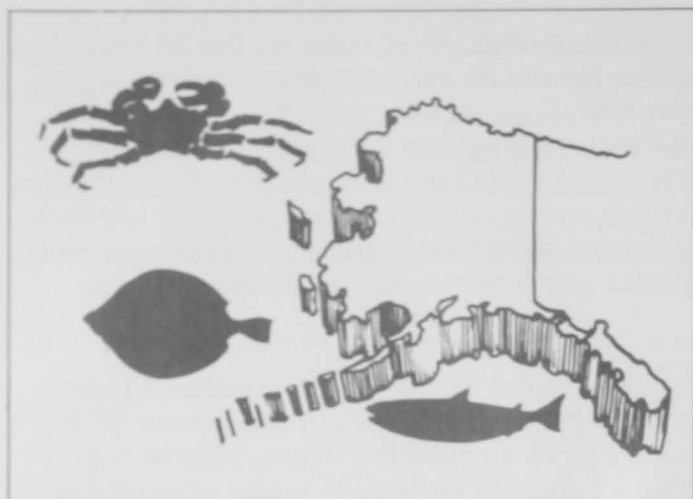
A second pressing problem has to do with understanding what effects variations in the marine environment have upon the distribution and behavior of sardines. Studies of the relation between sardine and zooplankton distribution are underway. Additional work is planned on the relation between fish distribution and physical features of the environment.

Solution of these problems should bring answers to questions concerning interdependence between stocks of sardine off Mexico and off California, conditions under which the stock or stocks become available in California waters, and whether availability and abundance can be predicted and to what extent conditions might be improved by management of fishing rates.

Results to be Expected

The Pacific Southwest is at the receiving end of one of the major U.S. population shifts of this era. Despite the heavy landings, market fish have not been plentiful for many years because the major species are chiefly those exported from the region, largely as canned goods. Supplying the consumer market for fresh and frozen fishery products, with the increasing concentration of population producing a greater demand or turning to alternative foods, calls for economic analysis of the trends and proposals for solution of the problems. There is also need for technological research and for marketing activities by both Government and industry.

Fresh and Frozen Fish



Commercial fisheries account for more than half the value of all products of the State of Alaska and provide the major source of employment and income. The five species of salmon yield products valued from \$50 million to \$107 million annually, more than four-fifths the total value of all Alaska fishery products.

Federal Fishery Management

With the onset of statehood for Alaska, fishery management became the responsibility of the State on January 1, 1960. However, those management responsibilities which rest with the United States as a result of fishery treaties such as the Pacific Halibut Fishery Convention require continuation of certain Federal enforcement activities in Alaska. Ocean and inshore patrol of the fishery and in-

spection of halibut landings are necessary to assure compliance with the fishing regulations of the Halibut Commission.

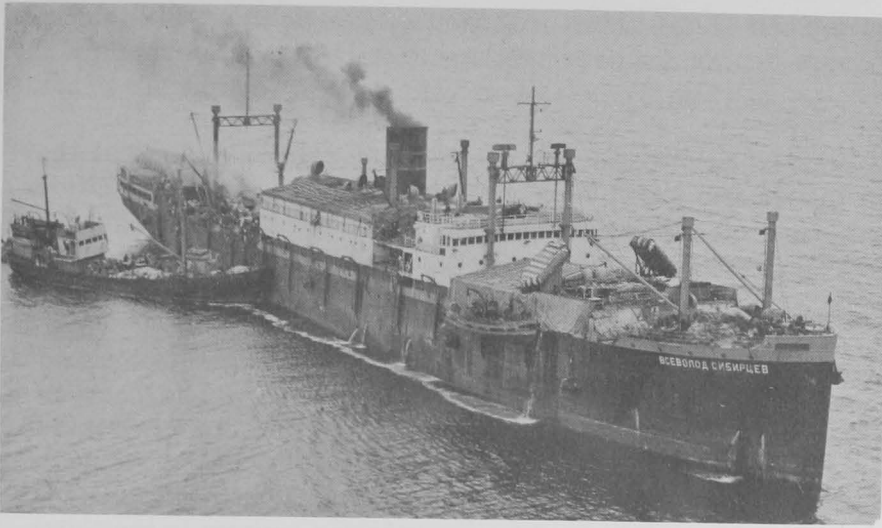
Under the terms of the Convention for the High Seas Fisheries of the North Pacific Ocean among Japan, Canada, and the United States, the Bureau participates in a joint research program by the three countries to achieve maximum sustained production from the high seas fisheries of the North Pacific Ocean. Certain high seas patrol functions are involved in connection with observance of the "Abstention Line" as provided in the Convention. The Bureau also has certain enforcement responsibilities under the Whaling Convention Act of 1949 and the Fur Seal Act of 1944.

Restoration of Salmon Fisheries

Despite efforts to reverse the trend, the annual yield of the salmon fisheries in recent years has declined to little more than half the average yields of 20 years ago, although in recent years the trend appears to have been reversed in some localities. One of our major deficiencies has been a lack of knowledge of the necessary details of salmon biology. For many years a minimal fishery research program has existed in Alaska, concentrating on solutions to local problems of immediate practical concern such as estimating the number of salmon in some important streams.

Facts are lacking on what things control the abundance of Alaska salmon. For example, before 1960 there was no research and little was known concerning Alaska chum salmon, despite the fact that the annual catch frequently exceeded 60 million pounds.

The long range plan provides for studies of life histories of various species in order to develop more accurate means of forecasting salmon runs and of appraising the volume of runs as they occur; and to determine the effects on the abundance of salmon of predators, competitors, water temperatures, and conditions in the streams at times of spawning. Research to determine optimum escapement for the various important



Although the one-time dory fishery for Bering Sea cod by U.S. vessels has disappeared, growing fishing fleets of foreign powers are finding it possible to reap a rich harvest. Here is shown a Soviet trawler transferring its catch to a factoryship in Bering Sea.



Each year the Pribilof Islands fur seal herd returns from far places in the Pacific to bear their young and breed. Management of the fur seals and the welfare of the Aleuts living on these remote Bering Sea islands are the responsibility of the Bureau of Commercial Fisheries.

salmon runs also is underway. Such basic studies will produce information of benefit to the State of Alaska in its management of the fisheries, and to the United States as a whole.

Recent investigations of young pink, chum, and red salmon show that they often suffer great losses during the transition from the streams to the ocean. Conditions during this brief period often determine the size of the run which later returns to the fishery. Oceanographic studies are needed in Alaskan waters to provide the basic knowledge with which these phenomena can be understood.

High Seas Research

The high seas salmon fisheries conducted by Japan have brought problems in the conservation of North American salmon stocks. The Convention for the High Seas Fisheries of the North Pacific Ocean was created to promote conservation of high seas stocks, particularly salmon, halibut, and herring. Offshore fur seal patrols near Chichagof and Baranof Islands, and observations of foreign whaling activity in the North Pacific and Bering Sea will be continued.

Research by the Bureau for the International Commission has shown that North American salmon from Alaskan streams range widely in the North Pacific Ocean and Bering Sea and intermingle with Asian fish over very broad areas. For the first time we have some definite knowledge of where our fish go during their sea life, and can demonstrate that they are caught in the Japanese fishery. We are steadily improving our estimates of the numbers of American salmon caught by Japan. Previously it was not possible even to show that these fisheries were harming us. There are plans for more adequate vessel facilities for research on the high seas.

Bering Sea Fisheries

Japanese and Soviet fishing operations have steadily expanded in the Bering Sea. Rich stocks of shrimp, red rockfish, cod, flatfish, pollock, and crabs have formed the basis for this industry. It has been estimated that the combined trawl fleets of Japan and Russia took 1 billion pounds in 1960 and about 2 billion pounds in 1961. The United States has not participated in this fishery in recent years except to catch some crabs and halibut. It is anticipated that these foreign operations will continue to expand and may eventually extend farther down the coast of North America. We have kept the fleets under observation so that we will know the number of vessels participating and areas fished. As foreign fisheries in this region grow, however, and as our own interest in these fisheries develops, the problems of management will become more acute. The Federal Government must plan to take action as necessary to ensure conservation of these resources and an adequate share for our fishermen in the future.

New or Little-Used Resources

The waters off Alaska probably contain a greater untapped reservoir of fish resources than any other region off the United States. Considering the increasing world demand for protein and the need for new sources of income for Alaska, nonutilization of these resources constitutes an economic waste. The extremely short season of most Alaska fisheries places a handicap on fishermen and increases cost of production.

A variety of species now unused or capable of much more extensive use, such as clams, shrimp, cod, crabs, sole, flounders, and rockfish, may be available in fall or winter. Exploratory fishing is required to find areas of concentration of these species

and to estimate their abundance. Methods of fishing or harvesting must be determined, and desirable market products developed. These operations will require the combined efforts of the State of Alaska, private enterprise, and the Bureau.

Wood Pulp and Power Developments

The wood products industry is second in importance to commercial fishing in Alaska. The pulp industry is expanding rapidly, and the use of major rivers for hydroelectric development also is becoming an increasingly important factor in the management of Alaska's fisheries. Research on the effects of logging operations on spawning streams is underway and of pesticide control of forest insects.

Comprehensive river basin surveys are being developed to provide basic data concerning rearing areas on major river systems, such as the Yukon, Susitna, and Copper Rivers, in order to forestall irreparable damage to the salmon runs. Such studies are also aimed at protecting all fish and wildlife habitat.

Economic Studies

With the development of additional information about the potentialities of Alaska's fisheries, a continual recalculation of comparative costs of production will be called for. In this way, the entry of additional Alaskan products into the national market can be forecast and even aided. As foreign fishermen continue their round-the-world search

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Fishery Cooperatives

Because of the well-established cooperatives through which the native communities have handled certain fisheries, it will probably be desirable to spend more time on cooperative extension work in Alaska than in other regions.

Transportation Studies

Transportation is a critical factor in Alaska because of the great distance from the rest of the United States, the difficulties of the terrain, the paucity of population, and other elements in the situation. In consequence, transportation costs are often a deciding factor both in determining the possibility of production and in resolving the feasibility of distribution. Hence, the study of transportation to

and from Alaska, as well as within the State, should be an important field of economic research.

Fur Seal Herd Restored

It is generally believed that the Alaskan fur seals represent about 85 percent of the fur seals of the North Pacific Ocean. The animals come ashore on the Pribilof Islands in the Bering Sea, congregating there from May to October to breed and bear their young. The Bureau is responsible for management and harvest of these animals.

The management program is a classic example of conservation in action. From a dwindling population of less than 150,000 seals in 1911, the herd has increased to about 1,500,000 animals under the protection of treaties with Canada, Japan, and Russia. Since 1939, about 69,000 skins have been taken annually, the sales of the U.S. share bringing from \$1 million to \$2 million per year in excess of operating costs.

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Management Policy Revised

Prior to 1956, the highly successful Federal management program protected female seals and killed only surplus males of this polygamous species. Because it is not efficient conservation to allow any wild-life population to reach its highest potential level, the Bureau is presently cropping female as well as male seals. It is intended that the herd eventually will be maintained at a maximum sustainable level of productivity with an annual harvest stabilized at about 60,000 males and approximately 30,000 females.

Fur Seal Research

The research program on the Pribilof Islands is designed to provide a constant check on the general welfare of the fur seal herd, including factors affecting survival and growth and the effects of management practices on the various population components and total numerical strength of the herd. The program also provides for fur seal distribution and food-habits studies at sea. Canada, Japan, and the U.S.S.R. participate in pelagic research under the provisions of the Interim North Pacific Fur Seal Convention of February 9, 1957.

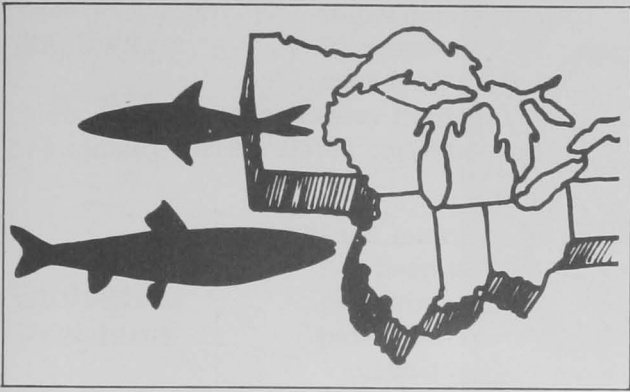
Pribilof Islands Administration

A program to modernize and enlarge physical facilities on the Pribilof Islands and to improve housing for Bureau staff and Aleut residents, who perform much of the labor in the Government-owned sealing industry, is largely completed. Many new buildings have been erected for various purposes. The present capacity of plant facilities on the Pribilof Islands is considered to be adequate for the foreseeable future. However, some older installations still need to be replaced or modernized.

Pribilof Island Natives

Since the Government first took over exclusive operation of the fur seal program, it has been charged with responsibility for the Aleut residents of the Pribilof Islands, of whom there are now about 650. Legislative requirements should be modified to place the Pribilof Aleut natives in the same position as all other citizens of Alaska as rapidly as arrangements can be made for the State to assume full responsibility for its Pribilof citizens. The Bureau has initiated training and relocation programs for the Aleut natives since the sealing industry is their only means of livelihood on the Islands.

GREAT LAKES



The Great Lakes are among the world's largest bodies of fresh water, 61,000 square miles in the United States, 34,000 in Canada, with a total shoreline exceeding 9,600 miles. The lakes lie in a densely populated and highly industrialized area. Roughly 40 percent of the country's entire population lives in the eight adjacent States.

Fishing was a principal industry among early settlers of the Great Lakes region. The fisheries developed rapidly as the Midwest was settled, and by the 1870's the catch had reached a point approximating the present total annual production of 110-130 million pounds in U.S. and Canadian waters combined. The U.S. catch, now about 65-75 million pounds, provides income for some 3,800 commercial fish-

The Great Lakes Fishery is Important

ermen; and the catch could be increased severalfold if all available species were harvested. Species such as smelt, chubs, alewives, suckers, and carp are extremely abundant, but only small quantities are captured by the present commercial fishery.

Recently the fisheries suffered a grievous setback not related to long-term deterioration. The destructive sea lamprey, which reached the upper lakes via the Welland Canal, has literally destroyed lake trout stocks of Lakes Huron and Michigan, and only a remnant population remains in Lake Superior. This was the leading quality fish in the Great Lakes, and its destruction has been a severe

Sea Lamprey Damages the Fishery

economic loss. Damage by lampreys to whitefish, walleyes, suckers, and chubs (deep-water ciscoes) is more difficult to assess but unquestionably has been severe. It is estimated conservatively that commercial fishermen are suffering an annual income loss of \$6 to \$8 million from lamprey predation.

Despite deterioration and near disaster, the Great Lakes still are the principal or only domestic source of traditionally prized whitefish, lake trout, ciscoes, yellow pike, blue pike, and yellow perch. Although the total weight of fish caught today still approximately equals catches of the 1870's, the species composition is greatly changed. The output of choicer, higher priced species has tended downward.

Great Lake Fisheries Offer Variety

In contrast, the cheaper or less-esteemed sheepshead, smelt, suckers, white bass, burbot, and carp are caught in greater quantities, and catches of these species could be increased enormously if economic difficulties could be overcome.

The Great Lakes are without large fishing centers corresponding to the great fishing ports of most ocean fisheries. Widely scattered along thousands of miles of shoreline, any village with passable shelter for small craft, even the mouth of a lesser tributary, may become a "fishing port." Production units are small, often family owned, and passed from father to son. Even large firms are small in comparison with marine fishery companies, and capital available

Fishing Units Small and Scattered

to individual units is correspondingly restricted. These factors have retarded technical and economic development.



The Atlantic sea lamprey, which invaded the Great Lakes via ocean-connecting canals, has decimated the valuable lake trout. Here adults migrating up a stream to spawn have been collected at an electrically energized weir.

Scars of lamprey attack on the adult lake trout shown here give visible evidence of the damage wrought by this parasite. Recent work in streams with selective poisons shows great promise for control of this Great Lakes parasite.



Fishery Backward

In this, technically one of the most advanced regions of the country, where machinery is largely fabricated and assembled automatically, fishermen are taking fish in much the same manner as they did 50 years ago and attempting to sell much of their produce "in the round." Vigorous steps must be taken if this valuable industry is to escape further collapse. Problems confronting the fishing industry on the Great Lakes are closely inter-related and must be attacked simultaneously.

Biological Problems

Since one of the major causes of the decline of the fisheries in the upper lakes has been predation by the sea lamprey, a control program for this predator was started a few years ago. Lamprey larvicide tests have been highly successful, and full scale field control is underway. In 1960, treatment of all streams producing lampreys in Lake Superior was completed. In 1962 there was a decline in the lamprey count of 80 to 90 percent below the 1961 figure. Counts made during early 1963 were about even with 1962.

The environmental niche formerly occupied by lake trout probably is still available and unfilled. Consequently, it is reasonable to believe that depleted stocks of lake trout in Lake Superior can be restored, and stocks in Lakes Huron and Michigan can be re-established. To accomplish this, a lake trout rehabilitation program is underway and results in Lake Superior are very promising. A study of the effect of reintroduction upon other species is also essential.

The possible effect of heavy fishing pressure upon the lake trout should not be ignored. When the lamprey population is brought under control at a low level of abundance, it should not be assumed that rehabilitation of the lake trout stocks will be easy. Careful biological studies and perhaps stringent restriction of lake trout fishing will be necessary. The Federal Government must cooperate closely with the States who have the management authority as these phases of the program develop. In addition, a considerably expanded biological program is planned to aid in understanding major fluctuations in abundance of stocks.

Costs of the program in the Great Lakes are financed from two sources. Sea lamprey research and control is carried out by the Bureau with funds obtained by contract with the Great Lakes Fishery Commission. The same treaty that establishes the Commission as implementing agency for lamprey operations also places upon the Commission the primary responsibility for the development of an adequate program of research on Great Lakes fishery resources generally. Research on the Great Lakes fishery resources is carried on by the States bordering the Great Lakes and by the Bureau.

Economic Problems

High costs of production, limited and unstable markets, the disproportionate costs of shipping small lots of fish, especially from remote areas, to major large-city outlets, and the rising volume of imports of the more desirable species from Canada account for the major economic difficulties of the Great Lakes fisheries.

An economic program, initiated in 1959, is being conducted to find methods of reducing production costs, to determine economic savings possible with various types of gear, and to assess effects of imports upon prices paid to fishermen.

Market development activities will include promotional and educational campaigns to expand markets of presently acceptable species and to increase acceptance of fish now hard to sell as human food, and location and development of outlets for uses other than human foods, such as pet foods, and fur-animal and poultry feeds. Technical assistance will be provided to aid the industry in application of research results.

The Bureau will assist by providing advice on the formation and operation of associations and cooperatives whereby the resources of groups of fishermen may be pooled for their common market.

The fishing industry on the Great Lakes also needs exploratory fishing to appraise the commercial potential of underutilized species, and technological assistance to determine the most efficient means of taking and processing the resources.

Gear development will include: (1) testing gear not presently used on the Great Lakes and developing new gear to reduce costs of production; (2) testing new fishing methods at various times and on various grounds to smooth out seasonal fluctuations in production and to provide additional supplies; and (3) testing and development or adaptation of sonic and other devices for locating fish. Since introduction of new gear will, in most instances, involve management problems, the States will be partners in this research. Fishery regulations should be reviewed and changed whenever appropriate to permit use of gear efficient enough for economic operation.

Food technology research will include: (1) better handling and storage procedures to improve quality; (2) improved processing methods to increase acceptability of choice species and elevate some coarse varieties to the food fish category; (3) methods of handling and processing other coarse varieties for industrial uses; and (4) mechanization to cut production costs.

MISSISSIPPI RIVER BASIN



Production of fish in the Mississippi River and tributaries is about equal to that on the Great Lakes, but average prices are lower. About 75 million pounds with a value of \$7 million are landed annually, providing full or partial employment for almost 10,000 fishermen.

Character of Fisheries and Problems Similar to Great Lakes

These fisheries are even more widespread than those in the Great Lakes, and problems of marketing, technology, gear research, and economics are similar. Research programs in these fields will be strengthened sufficiently to cover inland and lake areas as well as the Great Lakes. The Bureau should assist the States, whenever it appears necessary, to recognize and stress the need for pollution abatement. Close liaison with the Department of Health, Education, and Welfare in these matters will be emphasized.

Two unique considerations in this area deserve special mention. One is the effect of dams and other water development projects on the resource and the fishing industry; the other, the possibility of developing a commercial fishing industry in impoundment areas as a rough fish control measure, and as an additional source of protein food in times of national emergency.

**Some Problems
are Unique**

The Bureau is projecting a biological program for the Mississippi River Basin to develop scientific information which must underlie assessment of the effect of dams and other water development projects on commercial fishing in the area. This Bureau will work closely with the Bureau of Sport Fisheries and Wildlife and with the States concerned.

**River Basin
Development**

We plan to study the feasibility of using commercial fishing as a fish population control measure in impoundment areas, such as main stem reservoirs along the Missouri River. Sport fishermen exert virtually no pressure on rough fish populations, and without control rough fish may interfere with continued production of sport fish stocks. Sport fishing and commercial fishing are essentially compatible in reservoirs and many inland waters and may well be mutually beneficial. Our studies will embrace marketing, gear research, technology, economics, and statistics, in most cases using existing or contemplated facilities.

**Reservoir
Fishery
Management**

A recent development in the fisheries of this area is the use of impounded rice field acreage for the cultivation of sport and commercial fish. Cooperative organizations have already begun limited commercial fishing operations in these impoundments; and as these operations expand, markets must be developed for many of the species grown. The Bureau's marketing efforts will be increased as marketing problems develop in this area.

**Rice Field
Fisheries**

Among the problems calling for economic analysis is the viability of the new industry of raising food fish in rice farming territory. One of the possibilities that should be studied is the introduction of species with a higher market value. Another is the raising of aquarium stock. A third is the utilization of some species for animal feeding, as pet food in frozen or canned form, or as ingredients in dry foods. Fur farms, the other major outlet for fish as animal food, should also be the subject of an economic inquiry. The development of fish protein concentrate should also be studied in case it should offer a market for rice farm production as well as for the "rough" fish of the area and for those of the Great Lakes.

**Economic
Analysis**



Program Objectives

The purpose of the program based in Honolulu is to provide, through research, knowledge of the marine resources of the central Pacific, more efficient ways of harvesting these resources, and contributions to the development of fishery biology and oceanography. For these purposes, the Bureau's Biological Laboratory in Honolulu is ideally situated because it is located centrally in the Pacific and because local waters and fish stocks can be used as a natural laboratory.

Recent Progress

Abundant new fishery resources have been discovered, including yellowfin tuna in the equatorial Pacific, skipjack tuna beyond the limits of the present Hawaiian fishery and in the Marquesas, and albacore to the north and northeast of Hawaii.

Existing forms of gear have been modified to improve efficiency. The abundance of bait has been increased through introduction of one species and through development of fish farming methods for another species. The use of physical oceanography and marine biology as tools to locate areas of oceanic enrichment and abundant fish stocks has been pioneered. A subsurface equatorial current comparable in magnitude to the Gulf Stream has been discovered. Knowledge of the biology of tunas, including life histories, spawning areas, growth rates, and migrations has been greatly increased. This program has made substantial progress in relating oceanography to fisheries.

Short Term Research

During the initial phase of this program, additional sources of tunas were needed by the American fishery. Later, however, this need was met to an increasing degree from foreign sources and from domestic sources of competing protein materials. The recent revolutionary developments in tuna purse seine gear and methods have again turned the attention of the American tuna fishery to new sources of tuna. Great interest has been shown in known but undeveloped resources. Research activities aimed at defining the extent and magnitude of these resources are urgently needed.

In addition to providing research of benefit to developed fisheries, plans are being drawn to develop fisheries suited to the needs of island communities such as the Trust Territory of the Pacific Islands and American Samoa.

Improve Gear and Methods

Sea trials of a monofilament gill net have been made in order to evaluate this method as an alternate to pole-and-line fishing. The efficiency of using bait in conjunction with the gill net is also being studied as a means of capturing tuna.

Improve Fishing Success

The results of studies of tuna distribution and abundance in relation to the environment may make it possible to scout efficiently for tuna schools. Fishermen may prepare for good seasons or extend their effort in poor seasons. Oceanographic studies have made it possible to forecast abundance of skipjack about 3 months prior to the season of the Hawaiian fishery.

Long Term Research

A continuing effort directed at increasing efficiency must be made. An understanding of the relationships between the fish and their environment, both biological and physical, must be sought in order that more efficient methods of harvest may be applied. New resources must be found and old ones defined; research techniques long used in studying domestic animals have recently been applied to defining genetic populations of fish. In order to properly understand the nature of a fishery or resource, it is imperative to know whether one or more reproductive groups enter into a fishery. Similar information is also vital to a rational approach to international fishery agreements.

With increased knowledge leading to an increase in efficiency, additional sources of raw materials are needed. In addition, failure to enter such fisheries in the relatively near future may well result in our exclusion from them when the need is more acute.

Basic studies of the marine resources of the central Pacific and how they are affected by their environment are a requisite for solution of immediate and future problems, the nature of which cannot now be anticipated.

Economic Studies

A study is needed of a general enough character so that the economic problems of the fisheries and the associated problems of the economy as a whole can be identified and described. A program of economic research can be established on the basis of such a study. One of the items in such a program can be readily foreseen. This problem involves calculating the expected changes in the makeup and numbers of the population which will occur in succeeding years. These data, together with an analysis of the changing character of fish consumption in the area, will provide the framework for a study of the volume of the exportable surplus and how the future population will be supplied with the types of fishery products that they will demand. It may also point the way toward influencing that demand in certain ways. For example, it may be possible to divert demand toward certain products which are likely to be in ample supply and to diminish the demand for other commodities.

CONTRACTS AND GRANTS

In recent years the Bureau has supplemented the work of its own staff by contracting with universities, State and Federal agencies, and private organizations. The purpose of such contracts has been to solve problems, often of a short term nature, usually requiring special skills and elaborate equipment not available in Bureau laboratories. In this way, certain specialized objectives can be accomplished more quickly and at less cost to the Government.

Contracting for a much greater amount of specialized work became possible when additional funds were provided by enactment of the Act of July 1, 1954, the Saltonstall-Kennedy Act. A considerable portion of these funds was allocated for contracts originally in the interest of initiating important programs promptly and effectively supplementing the activities the Bureau was conducting. As demands upon the established activities of the Bureau increased through the occurrence of crises in the fishing industry, and permanent staff and facilities qualified to deal with such problems were acquired, the funds available for negotiating contracts necessarily decreased.

Many valuable research findings have resulted from contracts. The procedure has such definite special advantages that it should be utilized to the fullest to make the most effective use of funds, time, personnel, and equipment.

The Bureau has authority to make grants to public and private educational and research institutions. This authority has been used sparingly in the past because of the need to allocate available funds to achieve special results. However, the Bureau fully recognizes the value of grants in carrying out essential research and in providing training for personnel. For example, one consequence of the recent widespread interest in marine science has been the realization that expansion of oceanographic research in the United States will be limited by the supply of qualified scientists. Even at present levels of operation, the quality of research could be improved if a larger group of trained candidates were available from which to select personnel. To play its proper part in stimulating scientific investigation of the resources of the sea, the Bureau should be prepared to encourage able students to enter this field of study and to assist qualified institutions to provide funds and facilities for this purpose. Such arrangements produce double benefits by conducting special research projects of benefit to the people of the United States and by training scientists who will contribute to increased benefits. This can be achieved most effectively by establishing a program of grants and fellowships in the more important fields of fishery interests. Such a program is now underway.

Consideration of applications for grants and allocations of funds to the appropriate recipients are not simple procedures. Various Federal agencies, such as the National Science Foundation, the National Institutes of Health, etc., have had substantial amounts of funds available for allocation as grants and considerable experience in making the most effective distribution of grants among the many qualified applicants. They have achieved significant results by making use of nongovernmental scientists and administrators to review requests and advise on policies to be followed. The Bureau is patterning its procedures after these successful methods, utilizing an advisory panel of nongovernmental fishery scientists and administrators.

TECHNICAL REPORTS

Prompt and adequate reporting of the results of research and service activities is the medium by which the work of those active in these fields is communicated to each other and to the public. Whether it be in the fields of the biological, chemical, or engineering sciences or in marketing, statistical, or informational work, communication with other workers is important, for it provides mutual benefits by making achievements available to all and stimulates further progress through interchange of new ideas and techniques. Prompt and technical communication with the fishing industry is even more important, for this is the only way in which industry can take full advantage of the scientific findings. Communication with the general public is perhaps most important of all, for conservation and wise management of our natural resources to be successful must be understood and practiced by all; the mistaken beliefs, half-truths, and traditions of centuries must be dispelled; and the basic principles and practices of resource management must become so much a part of public thinking that they are believed and followed automatically. To achieve this level of public understanding and acceptance would be one of the greatest single contributions that could be made to the fisheries. Proper attention to this challenge is an important part of our program.

The Bureau publishes more than 300 technical reports of various kinds each year. These range from highly specialized scientific papers to popular articles in trade journals and national magazines. These articles appear in 10 different publication series of the Department of the Interior and in a wide variety of non-Government journals. Articles of a strictly scientific nature appear in the Fishery Bulletin, Fishery Industrial Research or the Special Scientific Reports--Fisheries series, but more than two-thirds of all scientific papers issued under the names of Bureau personnel appear in outside journals. There are several reasons for this extensive use of outside publications, the most compelling of which is a legitimate desire to publish highly technical material of a specialized nature in a journal that will reach other scientists working in the same field. Other reasons are excessive time between receipt of manuscripts and appearance in print in Government series and greatly reduced costs for outside publications. With increased responsibilities and expanded research staffs, these problems have become increasingly acute in the past 10 years. The Bureau plans to reap the prestige and other benefits that would accrue from publication of high quality scientific papers in its own scientific journal. Therefore, as a solution to these problems we are reorganizing our editorial unit along more efficient lines, using existing periodicals in a more flexible way, to ensure adequate flow of scientific and technical information.

It is even more important that the Bureau disseminate information on research achievements to fishermen and the general public. At present, a part of the Bureau's fishery research results is published as timely, widely distributed articles. Since these can be circulated widely at little or no cost to the Government, the Bureau proposes to increase this output at every opportunity. The consequent benefits to the people of the United States would be considerable.

PERSONNEL PROGRAM

The Bureau is developing a personnel program and believes that no re-
sults can be expected from a personnel program unless it is based on a
thorough knowledge of service conditions and the needs of the personnel. The
program should be designed to attract, develop, and retain the best young prospects
and to provide them with the opportunity to advance in their careers. The
program should be based on the following principles: (1) to provide an environment
in which the best young prospects can develop and advance in their careers;
(2) to provide a program of training and development for the personnel;
(3) to provide a program of advancement for the personnel; (4) to provide a
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TECHNICAL REPORTS

Communication is Important

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PERSONNEL PROGRAM

The Bureau is developing a personnel program on the premise that no research project, no program of service, and no up-to-date development program can be successful without competent, experienced, informed, and energetic personnel. The Bureau's aims in the personnel field are threefold: (1) to attract the top young prospects for jobs; (2) provide an environment in which these workers can produce to their maximum capacity; and (3) institute a program which will insure the retention of top professionals in the field of fisheries. The Bureau now is developing personnel management policies which will attain these objectives.

It is recognized that there is a severe shortage in some scientific categories. Where in the past the Bureau has relied mainly on general fishery biologists and chemists to fill positions in its biological and technological laboratories, today it is hiring more and more specialists. It is anticipated that in the future this policy will develop to an even greater degree. Toward this end the Bureau intends to carry out positive recruitment programs, starting at the undergraduate level, that will encourage interested young people to consider the advantages of a career which will lead them to Bureau laboratories. The availability of qualified scientific personnel is one of the most critical problems facing the Bureau and the Nation. An aggressive program is needed to insure that the Bureau interests highly qualified young scientists in the work of the Government carried on in laboratories of the Bureau of Commercial Fisheries.



As a tangible product of research, publications are of fundamental importance. Donald L. McKernan, Director of the Bureau of Commercial Fisheries, (left) is presenting the first annual cash award for outstanding scientific papers to Dr. Elbert H. Ahlstrom, Director of the Bureau's Biological Laboratory, La Jolla, Calif.

FACILITIES

Acquisition and maintenance of laboratories, offices, vessels, and equipment have lagged seriously behind present needs. Gradual expansion of research programs and activities providing services to the industry has far outrun the adequacy of existing facilities. Skilled staffs are forced to use temporary accommodations, some of which are hazardous to personnel and equipment.

As a result of steadily increasing responsibilities and expanding programs in the past 15 years, many of the Bureau's laboratories and offices are seriously overcrowded, impairing the working efficiency of highly trained scientists. Too many research staffs are housed in ancient frame buildings, some of which have been condemned and should be replaced immediately. The productivity of technical personnel and safety of valuable records and equipment would be increased by providing modern laboratories and adequate working space. Some of these conditions have been rectified by the construction of new laboratories at Woods Hole, Mass., Auke Bay, Alaska, and Oxford, Md. At Ann Arbor, Mich., a new laboratory has been designed, and at La Jolla, Calif., and Seattle, Wash., construction of new laboratories is underway.

Buildings for Oceanography

As a program is developed to meet the national need for increased knowledge of the oceans, the Bureau will require additional laboratory facilities to discharge its responsibilities for research in marine biology. New laboratories or additions to present laboratories will be needed to plan and conduct research and analyze the data collected by the new marine research vessels recommended for the Bureau.

Vessels

By the very nature of the work, floating equipment is of utmost importance to fishery research and regulatory functions. The craft required range from small skiffs to large seagoing vessels. These large vessels, frequently operating hundreds of miles offshore and required to remain at sea for extended periods, need to be especially sound and seaworthy, and must be designed with many special features unlike those of any other craft.

Operation of marine equipment is at best an expensive undertaking, and hidden losses through use of antiquated and inefficient vessels and gear add materially to these costs. The Bureau's fleet of exploratory fishing, oceanographic, technological, biological research, and other special-purpose vessels includes 14 over 50 feet in length, several chartered vessels, and numerous smaller craft. Several are over 100 feet long. The estimated replacement value of this fleet is more than \$12 million at 1959 prices. Funds to replace the 180-foot Albatross III, removed from service in 1959, were appropriated for use in fiscal year 1961, and the vessel now is completed and in service. Also, funds for replacement of the exploratory vessel Delaware have been appropriated. The Townsend Cromwell, another new oceanographic vessel, to be based at Honolulu, also is under construction, and a contract has been awarded for the David Starr Jordan, a replacement for the Black Douglas.

Replacement of Vessels

Most of the larger vessels were acquired from surplus outlets and were not designed and built to meet the objectives of the program efficiently; therefore, modern specially designed vessels must be obtained. It is often asked why surplus Navy vessels cannot be adapted for use as research craft at much less cost. Experience has shown that this is not feasible, for costs of conversion for scientific research are high, and the final result is always a compromise, never entirely satisfactory for the purpose, and involves

hidden costs related to inadequate and inefficient facilities. A long term replacement program would provide an orderly basis for securing a modern and efficient fleet.

Any expanded responsibilities, including the Bureau's role in the National Oceanography Program, will require additional ships beyond those classified as replacements.

Other equipment, such as scientific instruments, fishing gear testing devices, electronic instruments, and other operational apparatus will be needed. Maximum efficiency will be assured by utilizing every method of increasing the productivity of scarce technical personnel. Particularly important is the application of modern technology to development of new instruments for marine research.

The Bureau does not now have basic legislative authority to acquire land for new buildings for biological and technological research and other activities. In the past, such authority has been received in the annual appropriation act language when construction funds were appropriated. A general authority enacted by Congress would preclude the need for specific authorization and is essential to proper programming.

Land Acquisition



The Bureau's Honolulu Biological Laboratory is an example of a physical facility that has proven its worth as a place for Bureau scientists to carry on their work.



The Bureau's M/V Charles H. Gilbert has been modified for direct observation of fish from viewing chambers fore and aft. Use of a small, specially-designed submarine, which would be more effective, is being studied.



In the Pacific, skipjack and other tuna are being studied at sea by means of underwater viewing chambers. Skipjack represent a sparsely-used, widely distributed potential harvest.

PART III - COUNTING THE COST AND MEASURING THE GAIN

The Bureau's programs should contribute to the Department's balanced resources program by expanding directions essential to the future welfare of the fishery and national economies. New programs should be initiated to continue to meet the Bureau's responsibilities under the Fish and Wildlife Act of 1956.

Operating Costs The operating cost of the programs outlined, exclusive of capital expenditures, would be about double during the next 10 years.

Construction Costs In addition to the operating funds, an annual capital outlay would be required for new laboratory buildings and facilities, replacement of antiquated laboratories and worn vessels, and construction of new vessels essential to an expanded program. These needs make it necessary to program construction amounts which would average about one-third of the operation costs.

Measuring the Gain The cost can be counted in dollars. The gain must be measured in accomplishments of goals expressed through Congress in the Fish and Wildlife Act. In essence these are: to conserve the resource and strengthen the industry through research, development, and services.

Gains in Conserving the Resource The resource is a public asset. It is living and renewable. It can be increased through wise use; or it can deteriorate with neglect. Wise use requires research applied with vigor to crucial points in the barrier of ignorance. The Bureau's program provides all the force that can be mustered in the face of present shortages of technical and scientific manpower. The Bureau believes its program selects the crucial points toward which to direct the force now.

Knowledge gained from research can conserve the resource only through proper application. This means not merely regulating to repress overfishing. It means also applying constructive measures to increase the resource. This is called resource management. This report expresses the principles of, and planned the means for, management where the Federal Government has the responsibility.

A Quick Summing Up The fishing industry is a public asset as much as the resource itself. The industry is the means through which the resource benefits the public. Unlike the resource, which must be managed by the public through its governments, local and national, the industry supplies its own management. But industry can fulfill its proper function only when healthy and strong. The strength of the fishing industry has been drained away in several directions. The Bureau's program is designed to stanch the flow and pump back new strength into the industry by all methods consistent with the public interest.

The Bureau plans research and services consistent with that provided by Government generally and spelt out specifically in the Fish and Wildlife Act of 1956. Included in the plan is research in oceanography, biology, technology, and economics; and services to provide current information on production and trade, market promotion and development, and extension activities.

The Bureau has planned as much research and other technical services as it thinks can be staffed under present conditions of scientific and technical manpower. The Bureau thinks the programmed activities will not only prevent further weakening of the industry but also will build back its strength in some measure. This strength will help satisfy the public demand with a constant supply of high quality fishery products available in variety to suit every taste, in a form to suit every need, and at a price to fit every pocketbook.



ANNEX 1

DOMESTIC PRODUCTION AND IMPORTS - CERTAIN FISHERY ITEMS, VARIOUS YEARS

(Millions of pounds)

ITEM	YEAR	DOMESTIC PRODUCTION	IMPORTS	TOTAL	PERCENT OF U.S. SUPPLY IMPORTED
FILLETS:					
GROUND FISH	1939	100	10	110	9
	1950	137	66	203	33
	1955	105	128	233	55
	1959	91	185	276	67
	1960	94	156	250	62
	1961	93	195	288	68
	1962 ¹	91	221	312	71
OTHER	1939	26	6	32	19
	1950	56	31	87	36
	1955	52	55	107	51
	1959	56	65	121	54
	1960	59	62	121	51
	1961	65	67	132	51
	1962 ¹	79	77	156	49
CANNED CRAB MEAT	1939	1	13	14	93
	1950	3	4	7	57
	1955	2	5	7	71
	1959	3	7	10	70
	1960	4	5	9	56
	1961	5	4	9	44
	1962 ¹	5	4	9	44
CANNED TUNA ²	1939	67	³ 13	80	16
	1950	153	57	210	27
	1955	114	118	232	51
	1959	132	206	338	61
	1960	149	204	353	58
	1961	174	195	369	53
	1962 ¹	156	236	392	60
SHRIMP (CATCH - HEADS-OFF)	1939	89	4	93	4
	1950	114	40	154	26
	1955	145	54	199	27
	1959	143	112	255	44
	1960	149	119	268	44
	1961	104	134	238	56
	1962 ¹	120	151	271	56
ALL EDDIBLE FISH- ERY PRODUCTS (CATCH - ROUND WEIGHT BASIS)	1939	2,713	635	3,348	19
	1950	3,307	1,008	4,315	23
	1955	2,579	1,323	3,902	34
	1959	2,369	1,873	4,242	44
	1960	2,498	1,738	4,236	41
	1961	2,490	1,819	4,309	42
	1962 ¹	2,523	2,070	4,593	45
ALL NONEDIBLE FISHERY PRODUCTS (CATCH - ROUND WEIGHT BASIS)	1939	1,732	614	2,346	26
	1950	1,594	638	2,232	29
	1955	2,230	980	3,210	31
	1959	2,753	1,372	4,125	33
	1960	2,444	1,375	3,819	36
	1961	2,697	2,214	4,911	45
	1962 ¹	2,717	2,571	5,288	49
TOTAL SUPPLY OF FISHERY PRODUCTS - EDDIBLE AND NONEDIBLE (CATCH - ROUND WEIGHT BASIS)	1939	4,445	1,249	5,694	22
	1950	4,901	1,646	6,547	25
	1955	4,809	2,303	7,112	32
	1959	5,122	3,245	8,367	39
	1960	4,942	3,113	8,055	39
	1961	5,187	4,033	9,220	44
	1962 ¹	5,240	4,641	9,881	47

¹ Preliminary.² Data on imported frozen tuna canned in the United States are included with imports.³ Includes bonito and yellowtail.

ANNEX 2

FISH AND WILDLIFE ACT OF 1956, AS AMENDED* (An excerpt from Title 16 of the United States Code)

Sec. 742a. Declaration of policy.

The Congress declares that the fish, shellfish, and wildlife resources of the Nation make a material contribution to our national economy and food supply, as well as a material contribution to the health, recreation, and well-being of our citizens; that such resources are a living, renewable form of national wealth that is capable of being maintained and greatly increased with proper management, but equally capable of destruction if neglected or unwisely exploited; that such resources afford outdoor recreation throughout the Nation and provide employment, directly or indirectly, to a substantial number of citizens; that the fishing industries strengthen the defense of the United States through the provision of a trained seafaring citizenry and action-ready fleets of seaworthy vessels; that the training and sport afforded by fish and wildlife resources strengthen the national defense by contributing to the general health and physical fitness of millions of citizens; and that, properly developed, such fish and wildlife resources are capable of steadily increasing these valuable contributions to the life of the Nation.

The Congress further declares that the fishing industry, in its several branches, can prosper and thus fulfill its proper function in national life only if certain fundamental needs are satisfied by means that are consistent with the public interest and in accord with constitutional functions of governments. Among these needs are:

(1) Freedom of enterprise--freedom to develop new areas, methods, products, and markets in accordance with sound economic principles, as well as freedom from unnecessary administrative or legal restrictions that unreasonably conflict with or ignore economic needs;

(2) Protection of opportunity--maintenance of an economic atmosphere in which domestic production and processing can prosper; protection from subsidized competing products; protection of opportunity to fish on the high seas in accordance with international law;

(3) Assistance--assistance consistent with that provided by the Government for industry generally, such as is involved in promoting good industrial relations, fair trade standards, harmonious labor relations, better health standards, and sanitation; and including, but not limited to--

(a) services to provide current information on production and trade, market promotion and development, and an extension service,

(b) research services for economic and technological development and resource conservation, and

(c) resource management to assure the maximum sustainable production for the fisheries.

The Congress further declares that the provisions of sections 742a-742j of this title are necessary in order to accomplish the objective of proper resource

*Section 1 of the Act of August 8, 1956, provided that the Act, which enacted sections 742a-742d, 742e-742j of Title 16 of the United States Code, and amended section 713c-3 (e) of Title 15 of the United States Code, should be popularly known as the "Fish and Wildlife Act of 1956." Section 713c-3 of Title 15 was enacted by the Act of July 1, 1954, which has come to be known as the Saltonstall-Kennedy Act or S-K Act.

development, and that such sections shall be administered with due regard to the inherent right of every citizen and resident of the United States to engage in fishing for his own pleasure, enjoyment, and betterment, and with the intent of maintaining and increasing the public opportunities for recreational use of our fish and wildlife resources, and stimulating the development of a strong, prosperous, and thriving fishery and fish processing industry. (Aug. 8, 1956, ch. 1036, Sec. 2, 70 Stat. 1119.)

Sec. 742b. United States Fish and Wildlife Service.

- (a) Establishment; Assistant Secretary for Fish and Wildlife and Commissioner of Fish and Wildlife; Bureau of Commercial Fisheries and Bureau of Sport Fisheries and Wildlife.

There is established within the Department of the Interior the position of Assistant Secretary for Fish and Wildlife, and the position of Commissioner of Fish and Wildlife. Such Assistant Secretary shall be appointed by the President, by and with the advice and consent of the Senate, and shall be compensated at the same rate as other Assistant Secretaries. The Commissioner shall be appointed by the President by and with the advice and consent of the Senate. He shall receive compensation at the same rate as that provided for Grade GS-18. There is also established a United States Fish and Wildlife Service within the Department, consisting of two separate agencies, each of which shall have the status of a Federal Bureau. There shall be a Director of each of said Bureaus appointed by the Secretary. One of the agencies shall be known as the "Bureau of Commercial Fisheries" and the other agency shall be known as the "Bureau of Sport Fisheries and Wildlife." The United States Fish and Wildlife Service, except as prescribed by sections 742a-742j of this title, shall succeed to and replace the presently existing Fish and Wildlife Service of the Department.

- (b) Administration and supervision.

The functions of the United States Fish and Wildlife Service hereby established shall be administered under the supervision of the said Commissioner of Fish and Wildlife, who shall be subject to the supervision of the Assistant Secretary for Fish and Wildlife.

- (c) Functions and responsibilities of Secretary of the Interior.

All functions and responsibilities placed in the Department of the Interior or any official thereof by sections 742a-742j of this title shall be included among the functions and responsibilities of the Secretary of the Interior, as the head of the Department, and shall be carried out under his direction pursuant to such procedures or delegations of authority as he may deem advisable and in the public interest.

- (d) Distribution of functions, powers, and duties of former Fish and Wildlife Service.

In order to make a proper distribution between the two Bureaus of the United States Fish and Wildlife Service established by sections 742a-742j of this title, the previously existing functions, powers, duties, authority, liabilities, commitments, personnel, records, and other properties or matters previously handled by or administered through the former Fish and Wildlife Service of the Department, shall be distributed as follows:

- (1) The Bureau of Commercial Fisheries shall be responsible for those matters to which sections 742a-742j of this title apply relating primarily to commercial fisheries, whales, seals, and sea lions, and related matters;

(2) The Bureau of Sport Fisheries and Wildlife shall be responsible for those matters to which sections 742a-742j of this title apply relating primarily to migratory birds, game management, wildlife refuges, sport fisheries, sea mammals (except whales, seals, and sea lions), and related matters; and the funds and allocations, appropriated or otherwise, relating to the matters covered by paragraphs (1) and (2) of this subsection shall be distributed between such Bureaus as the Secretary of the Interior shall determine.

(e) Rules and regulations.

Except as changed by the terms of sections 742a-742j of this title or by subsequent laws or regulations, all laws and regulations now in effect relating to matters heretofore administered by the Department of the Interior through the former Fish and Wildlife Service as heretofore existing, shall remain in effect.

(f) Administrative procedures.

In recognition of the need for authority to execute the purposes of sections 742a-742j of this title effectively, the Secretary of the Interior shall exercise such general administrative authority consistently with the terms of such sections as he shall find to be necessary to carry out the provisions of such sections effectively and in the public interest. In order to allow sufficient time to place the reorganizations under such sections into effect, the Secretary is authorized to establish an effective procedure and date of such reorganizations, notice of which shall be published in the Federal Register. Such reorganization shall be accomplished as soon as practicable after August 8, 1956, but not later than ninety (90) calendar days after August 8, 1956. (Aug. 8, 1956, ch. 1036, Sec. 3, 70 Stat. 1120; Oct. 4, 1961, Pub. L. 87-367, Sec. 103(14), 75 Stat. 788.)

Sec. 742c. Loans for financing and refinancing of operations, maintenance, replacement, repair, and equipment of fishing gear and vessels, and for research.

(a) Authorization.

The Secretary is authorized under rules and regulations and under terms and conditions prescribed by him, to make loans for financing and refinancing of operations, maintenance, replacement, repair, and equipment of fishing gear and vessels, and for research into the basic problems of fisheries.

(b) Conditions.

Any loans made under the provisions of this section shall be subject to the following restrictions:

- (1) Bear an interest rate of not less than 3 per centum per annum;
- (2) Mature in not more than ten years;
- (3) No financial assistance shall be extended pursuant to this section unless reasonable financial assistance applied for is not otherwise available on reasonable terms.

(c) Fisheries loan fund.

There is created a fisheries loan fund, which shall be used by the Secretary as a revolving fund to make loans for financing and refinancing under this section. Any funds received by the Secretary on or before June 30, 1965, in payment of principal or interest on any loans so made, shall be deposited in the fund and be available for making additional loans under this section. Any funds so received after June 30, 1965, and any balance remaining in the fund at the close of June 30, 1965 (at which time the fund shall cease to exist), shall be covered into the Treasury as miscellaneous receipts. There are authorized to be appropriated to the fund the sum of \$20 million to provide initial capital.

(d) Modification of loan contract.

The Secretary, subject to the specific limitations in this section, may consent to the modification, with respect to the rate of interest, time of payment of any installment of principal, or security, of any loan contract to which he is a party. (Aug. 8, 1956, ch. 1036, Sec. 4, 70 Stat. 1121; Sept. 2, 1958, Pub. L. 85-888, 72 Stat. 1710.)

[Amendments]

[1958--Subsec. (c) amended by Pub. L. 85-888 to increase authorization for \$10 million to \$20 million.]

Sec. 742d. Investigations; preparation and dissemination of information; reports.

The Secretary shall conduct continuing investigations, prepare and disseminate information, and make periodical reports to the public, to the President, and to Congress, with respect to the following matters:

- (1) The production and flow to market of fish and fishery products domestically produced, and also those produced by foreign producers which affect the domestic fisheries;
- (2) The availability and abundance and the biological requirements of the fish and wildlife resources;
- (3) The competitive economic position of the various fish and fishery products with respect to each other, and with respect to competitive domestic and foreign-produced commodities;
- (4) The collection and dissemination of statistics on commercial and sport fishing;
- (5) The collection and dissemination of statistics on the nature and availability of wildlife, progress in acquisition of additional refuges, and measures being taken to foster a coordinated program to encourage and develop wildlife values;
- (6) The improvement of production and marketing practices in regard to commercial species and the conduct of educational and extension services relative to commercial and sport fishing, and wildlife matters;
- (7) Any other matters which in the judgment of the Secretary are of public interest in connection with any phases of fish and wildlife operations.

(Aug. 8, 1956, ch. 1036, Sec. 5, 70 Stat. 1121.)

Sec. 742e. Transfer of functions, personnel, property, facilities, records, and funds; cooperation with other governmental agencies.

(a) There shall be transferred to the Secretary all functions of the Secretary of Agriculture, the Secretary of Commerce, and the head of any other department or agency,

as determined by the Director of the Bureau of the Budget to relate primarily to the development, advancement, management, conservation, and protection of commercial fisheries; but nothing in this section shall be construed to modify the authority of the Department of State or the Secretary of State to negotiate or enter into any international agreements, or conventions with respect to the development, management, or protection of any fisheries and wildlife resources or with respect to international commissions operating under conventions to which the United States is a party.

(b) There shall be transferred to the Department of the Interior so much of the personnel, property, facilities, records, and unexpended balances of appropriations, allocations, and other funds (available or to be made available) as the Director of the Bureau of the Budget determines to be necessary in connection with the exercise of any functions transferred to the Secretary pursuant to subsection (a) of this section.

(c) The Secretary may request and secure the advice or assistance of any department or agency of the Government in carrying out the provisions of sections 742a-742j of this title, and any such department or agency which furnishes advice or assistance to the Secretary may expend its own funds for such purposes, with or without reimbursement from the Secretary as may be agreed upon between the Secretary and the department or agency. (Aug. 8, 1956, ch. 1036, Sec. 6, 70 Stat. 1122.)

Sec. 742f. Policies, procedures, and recommendations.

(a) The Secretary of the Interior, with such advice and assistance as he may require from the Assistant Secretary for Fish and Wildlife, shall consider and determine the policies and procedures that are necessary and desirable in carrying out efficiently and in the public interest the laws relating to fish and wildlife. The Secretary, with the assistance of the departmental staff herein authorized, shall:

(1) develop and recommend measures which are appropriate to assure the maximum sustainable production of fish and fishery products and to prevent unnecessary and excessive fluctuations in such production;

(2) study the economic condition of the industry, and whenever he determines that any segment of the domestic fisheries has been seriously disturbed either by wide fluctuation in the abundance of the resource supporting it, or by unstable market or fishing conditions or due to any other factors he shall make such recommendations to the President and the Congress as he deems appropriate to aid in stabilizing the domestic fisheries;

(3) develop and recommend special promotional and informational activities with a view to stimulating the consumption of fishery products whenever he determines that there is a prospective or actual surplus of such products;

(4) take such steps as may be required for the development, advancement, management, conservation, and protection of the fisheries resources; and

(5) take such steps as may be required for the development, management, advancement, conservation, and protection of wildlife resources through research, acquisition of refuge lands, development of existing facilities, and other means.

(Aug. 8, 1956, ch. 1036, Sec. 7, 70 Stat. 1122.)

[Codification]

[Section was enacted without a subsection (b).]

Sec. 742g. Cooperation with State Department; representation at international meetings; consultations.

(a) The Secretary shall cooperate to the fullest practicable extent with the Secretary of State in providing representation at all meetings and conferences relating to fish and wildlife in which representatives of the United States and foreign countries participate.

The Secretary of State shall designate the Secretary of the Interior or the Assistant Secretary for Fish and Wildlife, or person designated by the Secretary of the Interior to represent the Department of the Interior, as a member of the United States delegation attending such meetings and conferences and also as a member of the negotiating team of any such delegation.

(b) The Secretary of State and all other officials having responsibilities in the fields of technical and economic aid to foreign nations shall consult with the Secretary in all cases in which the interests of fish and wildlife are involved, with a view to assuring that such interests are adequately represented at all times.

(c) Notwithstanding any other provision of law, the Secretary shall be represented in all international negotiations conducted by the United States pursuant to section 1351 of Title 19, in any case in which fish products are directly affected by such negotiations.

(d) The Secretary shall consult periodically with the various governmental, private nonprofit, and other organizations and agencies which have to do with any phase of fish and wildlife with respect to any problems that may arise in connection with such fish and wildlife. (Aug. 8, 1956, ch. 1036, Sec. 8, 70 Stat. 1123.)

Sec. 742h. Reports to Congress and the President.

(a) The Secretary of the Interior shall make an annual report to the Congress with respect to activities of the United States Fish and Wildlife Service under section 742a-742j of this title, and shall make such recommendations for additional legislation as he deems necessary.

(b) The Secretary is authorized to make a report to the President and the Congress, and when requested by the United States Tariff Commission in connection with section 1364 of Title 19, or when an investigation is made under the Tariff Act of 1930, the Secretary is authorized to make a report to such Commission, concerning the following matters with respect to any fishery product which is imported into the United States, or such reports may be made upon a request from any segment of the domestic industry producing a like or directly competitive product:

(1) whether there has been a downward trend in the production, employment in the production, or prices, or a decline in the sales, of the like or directly competitive product by the domestic industry; and

(2) whether there has been an increase in the imports of the fishery products into the United States, either actual or relative to the production of the like or directly competitive product produced by the domestic industry.

(Aug. 8, 1956, ch. 1036, Sec. 9, 70 Stat. 1123.)

Sec. 742i. Effect on rights of States and international commissions.

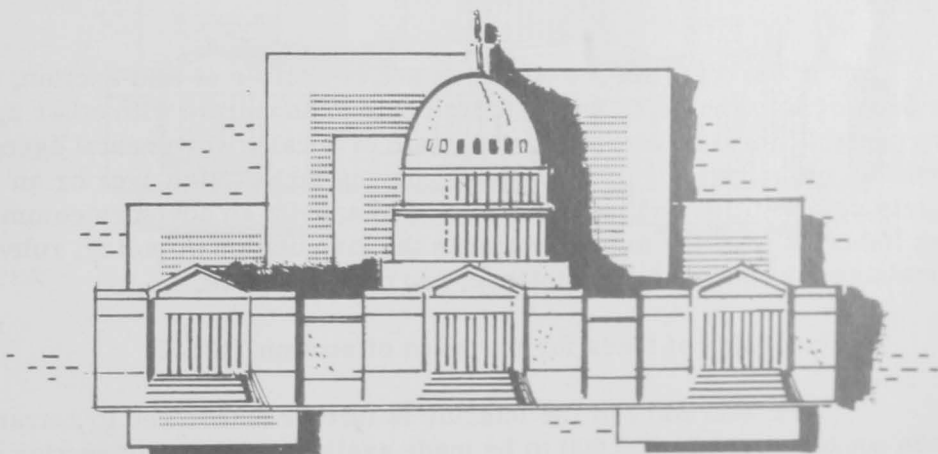
Nothing in sections 742a-742j of this title shall be construed (1) to interfere in any manner with the rights of any State under the Submerged Lands Act or otherwise provided by law, or to supersede any regulatory authority over fisheries exercised by the States either individually or under interstate compacts; or (2) to interfere in any manner with the authority exercised by any International Commission established under any treaty or convention to which the United States is a party. (Aug. 8, 1956, ch. 1036, Sec. 10, 70 Stat. 1124.)

Sec. 742j. Appropriations.

There are authorized to be appropriated such sums as may be necessary to carry out the provisions of sections 742a-742j of this title. (Aug. 8, 1956, ch. 1036, Sec. 11, 70 Stat. 1124.)

Sec. 742k. Management and disposition of vessels and other property acquired and arising out of fishery loans or related type of activities.

For the purpose of facilitating administration of, and protecting the interest of the Government in, the fishery loan fund established by section 742c of this title and any related type of activities relating to fisheries for which the Department of the Interior is now or may hereafter be responsible, the Secretary of the Interior, notwithstanding any other provision of law, may hereafter administer, complete, recondition, reconstruct, renovate, repair, maintain, operate, charter, assign, or sell upon such terms and conditions as he may deem most advantageous to the United States, any vessel, plant, or other property acquired by him on behalf of the United States and arising out of any fishery loan or any related type of activity by the Secretary of the Interior. The Secretary may use any of the applicable funds in each particular instance for the aforesaid purposes. (Sept. 13, 1961, Publ. L. 87-219, Sec. 1, 75 Stat. 493.)



ANNEX 3

SALTONSTALL-KENNEDY ACT, AS AMENDED* (An Excerpt from Title 15 of the United States Code)

Sec. 713c-3. Promotion of the free flow of domestically produced fishery products.

(a) Transfer of funds.

The Secretary of Agriculture shall transfer to the Secretary of the Interior each fiscal year, beginning with the fiscal year commencing July 1, 1954, and ending on June 30, 1957, from moneys made available to carry out the provisions of section 612c of Title 7, an amount equal to 30 per centum of the gross receipts from duties collected under the customs laws on fishery products (including fish, shellfish, mollusks, crustacea, aquatic plants and animals, and any products thereof, including processed and manufactured products), which shall be maintained in a separate fund and used by the Secretary of the Interior (1) to promote the free flow of domestically produced fishery products in commerce by conducting a fishery educational service and fishery technological, biological and related research programs, the moneys so transferred to be also available for the purchase or other acquisition, construction, equipment, operation, and maintenance of vessels or other facilities necessary for conducting research as provided for in this section, and (2) to develop and increase markets for fishery products of domestic origin, and (3) to conduct any biological, technological, or other research pertaining to American fisheries.

(b) Transfer of vessels of equipment by agencies.

For the purposes of this section, any agency of the United States, or any corporation wholly owned by the United States, is authorized to transfer, without reimbursement or transfer of funds, any vessels or equipment excess to its needs required by the Secretary of the Interior for the activities, studies, and research authorized herein.

(c) Cooperation by Secretary of the Interior with other agencies, etc.; advisory committee.

In carrying out the purposes and objectives of this section, the Secretary of the Interior is directed as far as practicable to cooperate with other appropriate agencies of the Federal Government, with State or local governmental agencies, private agencies, organizations, or individuals, having jurisdiction over or an interest in fish or fishery commodities and he is authorized to appoint an advisory committee of the American fisheries industry to advise him in the formulation of policy, rules and regulations pertaining to requests for assistance, and other matters.

(d) Retransfer of funds for purposes of section 713c-2.

The Secretary of the Interior is further authorized to retransfer any of the funds not to exceed \$1,500,000 to be made available under this section to the Secretary

*The Act of July 1, 1964, which was enacted as an amendment to the Act of August 11, 1939, was not given a popular title by the Congress but by common usage has become known as the Saltonstall-Kennedy Act or S-K Act.

of Agriculture to be used for the purposes specified in section 713c-2 of this title, and only such funds as are thus transferred shall be used for the purposes specified in section 713c-2 of this title with respect to domestically produced fishery products.

(e) Availability of funds.

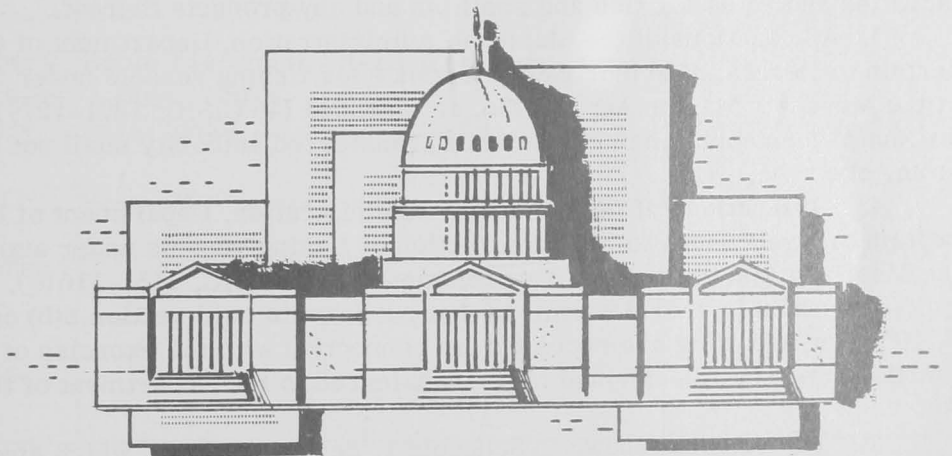
The separate fund created for the use of the Secretary of the Interior under subsection (a) of this section and the annual accruals thereto shall be available for each year hereafter until expended by the Secretary.

(f) Reports to Congressional committees.

The Secretary of the Interior shall make a report to the appropriate committees of Congress annually on the use of the separate fund created under this section. (Aug. 11, 1939, ch. 696, Sec. 2, 53 Stat. 1412; July 1, 1954, ch. 447, 68 Stat. 376; Aug. 8, 1956, ch. 1036, Sec. 12(b), 70 Stat. 1124.)

[CONTINUATION OF AUTHORIZATION FOR TRANSFER OF FUNDS]

[Section 12(a) of the Act Aug. 8, 1956, provided that: "The authorization for the transfer of certain funds from the Secretary of Agriculture to the Secretary of the Interior and their maintenance in a separate fund as contained in section 2(a) of the Act of August 11, 1939, as amended July 1, 1954 (68 Stat. 376), [subsection (a) of this section], shall be continued for the year ending June 30, 1957, and each year thereafter."]



ANNEX 4

DETERMINATION BY THE DIRECTOR OF THE BUREAU OF THE BUDGET

Transfer of Certain Functions Relating to Commercial Fisheries to Department of the Interior

Determination with respect to certain matters pursuant to Act of August 8, 1956

March 22, 1958

Pursuant to section 6(a) of the Act of August 8, 1956, popularly known as the Fish and Wildlife Act of 1956 (16 U.S.C. 742e), it is hereby determined that the following functions relate primarily to the development, advancement, management, conservation, and protection of commercial fisheries and shall be deemed to be transferred to the Department of the Interior by that Act:

1. The distribution and disposal of surplus fishery products now performed by the Department of Agriculture under the authority of the Act of August 11, 1939 (15 U.S.C. 713c-2).

2. All functions of the Department of Agriculture which pertain to fish, shellfish and any products thereof, now performed under the authority of title II of the Act of August 14, 1946, popularly known as the Agricultural Marketing Act of 1946, as amended (7 U.S.C. 1621-1627), including but not limited to the development and promulgation of grade standards, the inspection and certification, and improvement of transportation facilities and rates for fish and shellfish and any products thereof.

3. All functions of the Maritime Administration, Department of Commerce, which pertain to Federal ship mortgage insurance for fishing vessels under authority of title XI of the Merchant Marine Act of 1936, as amended (46 U.S.C. 1271-1279), provided that the amount of loans outstanding under this transferred authority shall not exceed \$10 million at any one time.

4. All functions of the Maritime Administration, Department of Commerce, which pertain to direct loans to aid construction of fishing vessels under authority of title V of the Merchant Marine Act of 1936, as amended (46 U.S.C. 1151-1161o).

It is further determined that pursuant to said section 6(b) of the Act of August 8, 1956, the following are necessary in connection with the exercise of the above listed functions and shall be deemed to be transferred to the Department of the Interior by that Act:

a. The amounts shown in Schedule 1, hereto attached, which amounts are hereby determined to be available for use, as specified in said schedule, in connection with the functions transferred by said Act;

b. The property and records shown in Schedule 2, hereto attached, which property and records were used or held in connection with the functions transferred by said Act.

MAURICE H. STANS,
Director.

Schedule 1--Funds to be transferred from U.S. Department of Agriculture to U.S. Department of the Interior under Section 6 of Public Law 1024, 84th Cong.

From--	Amount	To--
<u>Department of Agriculture</u> <u>Agricultural Marketing Service</u> (B) 1282500,020 Marketing Research and Service, Agricultural Marketing Service, 1958, Marketing Services, general.	\$5,000	<u>Department of the Interior</u> <u>Fish and Wildlife Service</u> 1481731 Management and Investigations of Resources, Bureau of Commercial Fisheries

Schedule 2--Property and records to be transferred from U.S. Department of Agriculture to U.S. Department of the Interior under Section 6 of Public Law 1024, 84th Cong.

Property--None.

Records--Description of property	Location	Method of storage	Number or volume transferred
I.C.C. dockets on fishery transportation rates.	Room 1441 South Bldg., USDA.	Record storage cartons	} Total cartons, 4.
Rail Freight Rate study 1957	-----do-----	-----do-----	
Other items including current market reports, correspondence with National Fisheries Institute and Oyster Institute, etc.	-----do-----	-----do-----	

ANNEX 5

LEGISLATIVE AUTHORITY

Act of March 3, 1887 (16 U.S.C. 744)

Authorized the Director of the Fish and Wildlife Service to prosecute investigations and inquiries concerning the supply of food fishes of the coasts and lakes of the United States and the determination of protective, prohibitory or precautionary measures to be adopted.

R.S. sec. 4396, 4397

24 Stat. 523

No Public Law Number

Act of March 3, 1887

39 Stat. 232

Public Law 100, 64th Cong.

Act of June 21, 1916

Pribilof Islands Administration (48 U.S.C. 220)

In 1903 jurisdiction, supervision, and control over Pribilof Islands and the fur seal herd was transferred from the Department of the Treasury to the Department of Commerce. Jurisdiction was later transferred to the Department of the Interior and the accumulated authority for management of the Pribilof Islands was superseded by the Act of February 26, 1944, sometimes known as the Fur Seal Act of 1944, infra.

32 Stat. 828

Public Law 87, 57th Cong.

Act of February 14, 1903

37 Stat. 736

Public Law 426, 62nd Cong.

Act of March 4, 1913

Act of August 15, 1914 (16 U.S.C. 781-785)

Regulates the taking or catching of sponges in the waters of the Gulf of Mexico and Straits of Florida outside of State jurisdiction. Also regulates the landing, delivery, curing, selling, or possession of sponges. Sets minimum wet size of sponges allowed to be taken, landed, delivered, cured, sold, or processed at five inches maximum diameter; provides maximum fine of \$500,000 and a lien against vessel used in committing violation; vests Secretary of the Interior with responsibility for enforcing the Act and authorizes him to request the use of Coast Guard craft and employees of Customs Service to assist in enforcement.

38 Stat. 692

Public Law 172, 63rd Cong.

Act of August 15, 1914

63 Stat. 495, 561

Public Law 207, 81st Cong.

Act of August 4, 1949

Act of June 21, 1916 (16 U.S.C. 744)

Authorizes investigations and experiments to control damage done by dogfish and other predacious fishes and aquatic animals.

R.S. sec 4396, 4397

24 Stat. 523

No Public Law Number

Act of March 3, 1887

39 Stat. 232

Public Law 100, 64th Cong.

Act of June 21, 1916

Federal Power Act (16 U.S.C. 811)

Provides that the Federal Power Commission shall require a licensee under the Act to construct, maintain, and operate, at the expense of the licensee, such fishways as may be prescribed by the Secretary of the Interior.

41 Stat. 1073	Public Law 280, 66th Cong.	Act of June 10, 1920
49 Stat. 845	Public Law 333, 74th Cong.	Act of August 26, 1935
53 Stat. 1433	1939 Reorg. Plan No. II	Effective July 1, 1939

Propagation of Mussels (16 U.S.C. 750-751)

Authorizes the establishment of a station on the Mississippi River for the rescue of fishes and the propagation of mussels in connection with fish-rescue operations throughout the Mississippi Valley.

42 Stat. 501	Public Law 203, 67th Cong.	Act of April 28, 1922
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The Black Bass Act, as amended (16 U.S.C. 851-856; 16 U.S.C. 1958 Ed., Supp. I, 855)

This Act makes it unlawful to transport to or from States, Territories or the District of Columbia any black bass or other fish caught, killed, taken sold, purchased, possessed, or transported, at any time contrary to the law of the State, Territory, or the District of Columbia where such acts were committed. The Act also authorized enforcement procedures.

44 Stat. 576	Public Law 256, 69th Cong.	Act of May 20, 1926
46 Stat. 845	Public Law 495, 71st Cong.	Act of July 2, 1930
61 Stat. 517	Public Law 258, 80th Cong.	Act of July 30, 1947
66 Stat. 736	Public Law 569, 82nd Cong.	Act of July 16, 1952
73 Stat. 430	Public Law 86-207	Act of August 25, 1959

Fisheries Construction and Maintenance (not codified)

Act of May 21, 1930, authorizes a 5-year construction and maintenance program for the Bureau of Fisheries. Although the 5-year period contemplated by this Act has expired, some provisions have been incorporated by reference in later enactments. See Columbia River Fishery Development Program, *infra*.

46 Stat. 371	Public Law 240, 71st Cong.	Act of May 31, 1930
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Fishery Cooperative Associations (15 U.S.C. 521)

This Act authorizes the formation of fishery marketing cooperatives and provides for their administration.

48 Stat. 1213	Public Law 464, 73rd Cong.	Act of June 25, 1934
53 Stat. 1433	1939 Reorg. Plan No. II	Effective July 1, 1939

Fish and Wildlife Coordination Act, as amended (16 U.S.C. 661-666c)

Authorizes the Secretary of the Interior to cooperate with Federal, State, and public or private agencies in the conservation and development of fish and wildlife resources affected by water-resource development programs. He is further authorized to make reports and recommendations on wildlife aspects of such projects based on surveys and investigations to be conducted by the Fish and Wildlife Service. These reports and recommendations are made an integral part of the report prepared by any Federal

agency, responsible for engineering surveys and construction of such projects, to be presented to Congress or authorizing agency.

48 Stat. 401	Public Law 121, 73rd Cong.	Act of March 10, 1934
60 Stat. 1080	Public Law 732, 79th Cong.	Act of August 14, 1946
62 Stat. 497	Public Law 697, 80th Cong.	Act of June 19, 1948
72 Stat. 563	Public Law 85-624	Act of August 12, 1958

Acquisition and Disposal of Surplus Fishery Products (15 U.S.C. 713c-2; 15 U.S.C. 713c-3; 15 U.S.C. 713c-3 Note; 7 U.S.C. 612c; 16 U.S.C. 742e; 23 F.R. 2304)

Authorizes the Secretary of the Interior to divert surplus fishery products from the normal channels of trade and commerce by acquiring them and providing for their distribution through Federal, State, and private relief channels. By a Memorandum of Understanding signed by the Acting Secretary of the Interior on May 22, 1958, and by the Acting Secretary of Agriculture on July 1, 1958, in order to avoid uneconomical and duplicate activity in fishery products procurement and distribution, it was agreed the Department of the Interior will request the Department of Agriculture to handle procurement and disposition of surplus fishery products for which a program of surplus products disposal is determined to be necessary. Such determination is to be made by the Secretary of the Interior who will then transfer the necessary funds to the Secretary of Agriculture to carry out the program.

50 Stat. 27	Public Law 15, 75th Cong.	Act of March 5, 1937
50 Stat. 61	Public Law 22, 75th Cong.	Joint Resolution of April 12, 1937
52 Stat. 441	Public Law 542, 75th Cong.	Act of May 25, 1938
53 Stat. 1411	Public Law 393, 76th Cong.	Act of August 11, 1939
(49 Stat. 774	Public Law 320, 74th Cong.	Act of August 24, 1935)
68 Stat. 376	Public Law 466, 83rd Cong.	Act of July 1, 1954
70 Stat. 1119	Public Law 1024, 84th Cong.	Act of August 8, 1956

The Northern Pacific Halibut Act of 1937, as amended (16 U.S.C. 772-772i)

Authority to enforce provisions of the Convention between the United States and Canada for the preservation of the halibut fishery of the North Pacific Ocean and the Bering Sea.

50 Stat. 325	Public Law 169, 75th Cong.	Act of June 28, 1937
67 Stat. 494	Public Law 228, 83rd Cong.	Act of August 8, 1953

Columbia River Basin Fishery Development Program (sometimes known as the Mitchell Act; 16 U.S.C. 755-757)

Establish salmon cultural stations in Washington, Oregon, and Idaho. Conduct necessary investigations and engineering and biological surveys and experiments as necessary, to conserve the fishery resources of the Columbia River and its tributaries; construct and install devices in the Columbia River Basin for the improvement of feeding and spawning conditions for fish, for the protection of migratory fish from irrigation projects, and for facilitating free migration of fish over obstructions; to perform all other activities necessary for the conservation of fish in the Columbia River Basin; and to utilize the facilities and services of the agencies of the States of Washington, Oregon,

and Idaho responsible for the conservation of the fish and wildlife resources in such States in carrying out the authorizations and duties imposed by the Act.

52 Stat. 345	Public Law 502, 75th Cong.	Act of May 11, 1938
60 Stat. 932	Public Law 676, 79th Cong.	Act of August 8, 1946

Fishery Educational Service and Market Development (15 U.S.C. 713c-3, 7 U.S.C. 612c; 16 U.S.C. 742d)

Authorizes the Secretary of the Interior to promote the free flow of domestically produced fishery products by conducting a fishery educational service and fishery technological, biological, and related research programs. He will make continuing investigations and report to the public, the President and Congress relative to the improvement of production and marketing practices of commercial species and the conduct of education and extension services relative to commercial fisheries.

53 Stat. 1412	Public Law 393, 76th Cong.	Act of August 11, 1939
(49 Stat. 774	Public Law 320, 74th Cong.	Act of August 24, 1935)
68 Stat. 376	Public Law 446, 83rd Cong.	Act of July 1, 1954
70 Stat. 1121	Public Law 1024, 84th Cong.	Act of August 8, 1956

Atlantic States Marine Fisheries Commission (16 U.S.C. 667a)

This Resolution authorized the named States to enter into a compact for cooperative effort and mutual assistance for the uniform, common or mutual regulation of fishing in the territorial waters and bays and inlets of the Atlantic Ocean on which such named States border or have jurisdiction. The subsequent interstate compact, as amended, (56 Stat. 267, Public Law 539, 77th Cong., Act of May 4, 1942; 64 Stat. 467, Public Law 721, 81st Cong., Act of August 19, 1950), designated the Fish and Wildlife Service as the primary research agency to promote better utilization of the Atlantic coast fish and shellfish resources.

54 Stat. 261	Public Resolution 79, 76th Cong.	Joint Resolution of June 8, 1940
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Protection of Fur Seals (sometimes known as the Fur Seal Act of 1944) (16 U.S.C. 631a-631q; 48 U.S.C. Prec. 21 Note)

Originally implemented the Provisional Fur Seal Agreement between the United States and Canada effected by an exchange of notes signed at Washington on December 8, 1942, and on December 19, 1942. This Provisional Agreement was later superseded by the Interim Convention on Conservation of North Pacific Fur Seals, signed at Washington on February 9, 1957, the parties to which are Canada, Japan, the Union of Soviet Socialist Republics, and the United States. The Act authorizes the management of the fur seal herd on the Pribilof or other islands and the conduct of sealing operations and disposal of products in conjunction therewith; production of byproducts; construction and maintenance of buildings and facilities; establishment of supply depots and furnishing of food, shelter, fuel, clothing, and other necessities of life to native inhabitants, including education; investigation of conditions of seal life on the Pribilof and other islands and the waters of the North Pacific Ocean frequented by fur seals; cooperation with other Federal agencies and other governments party to the fur seal agreement. The authorization contained in this Act, as amended, was continued in force after the admission of

Alaska to statehood by a specific provision of the Statehood Act which also provides for the payment to the State of 70 percent of the net proceeds derived from the harvest of fur seal skins and sea otter skins.

58 Stat. 100	Public Law 237, 78th Cong.	Act of February 26, 1944
61 Stat. 449, 450	Public Law 239, 80th Cong.	Act of July 25, 1947
64 Stat. 1071	Public Law 847, 81st Cong.	Act of September 27, 1950
72 Stat. 339	Public Law 85-508	Act of July 7, 1958

Predatory Sea Lampreys in the Great Lakes (16 U.S.C. 921)

Authorizes prosecution of investigation of abundance and distribution of sea lampreys, and their effects on fishes; experiments to develop control measures, and a vigorous program for the elimination of sea lamprey populations in the Great Lakes.

60 Stat. 930	Public Law 672, 79th Cong.	Joint Resolution of August 8, 1946
63 Stat. 616	Public Law 249, 81st Cong.	Act of August 18, 1949
65 Stat. 131	Public Law 94, 82nd Cong.	Act of July 30, 1951
66 Stat. 314	Public Law 434, 82nd Cong.	Act of July 1, 1952

Sockeye Salmon Fishing Act of 1947, as amended, (16 U.S.C. 776-776f)

Provides for the enforcement of provisions of the Convention between the United States and Canada for the protection, preservation, and extension of the Fraser River sockeye salmon fishery and for that of the pink salmon fishery as added by a protocol to the Convention.

61 Stat. 511	Public Law 255, 80th Cong.	Act of July 29, 1947
71 Stat. 293	Public Law 85-102	Act of July 11, 1957

Investigation of Fishery Resources of Territories and Island Possessions (sometimes known as the "Farrington Act of 1947"; 16 U.S.C. 758-758d)

Authorizes the study of the high seas fishery resources of the Territories and Island Possessions of the United States in the tropical and subtropical Pacific Ocean.

61 Stat. 726	Public Law 329, 80th Cong.	Act of August 4, 1947
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Rehabilitation of Oyster Beds in Louisiana and Mississippi (1948) Not Codified

Authorizes the appropriation of not more than \$50,000 to study means and methods best suited to the rehabilitation, replanting, and maintenance of oyster beds in Louisiana and Mississippi that might have been or may be destroyed by the operation of the Bonnet Carre Spillway and through the intrusion of fresh water and the blockage of natural passages west of the Mississippi River in the vicinity of Lake Mechant and Bayou Severin, Terrebone Parish, Louisiana.

62 Stat. 257	Public Law 545, 80th Cong.	Act of May 21, 1948
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Study of Soft and Hard-Shell Clams (16 U.S.C. 661 Note)

Authorizes, in cooperation with appropriate State and interstate agencies, comprehensive studies of the soft-shell clam Mya arenaria and the hard-shell clam

Venus mercenaria with particular respect to biology, propagation, and methods of cultivation of such clams.

62 Stat. 247 Public Law 556, 80th Cong. Act of May 26, 1948

Gulf States Marine Fisheries Commission (not codified)

Resolution granting the consent and approval of Congress to an interstate compact relating to the better utilization of the fisheries (marine, shell, and anadromous) of the Gulf coast and creating the Gulf States Marine Fisheries Commission. The compact designates the Fish and Wildlife Service as the primary research agencies of each named State.

63 Stat. 70 Public Law 66, 81st Cong. Joint Resolution of May 19, 1949

Atlantic Coast Shad Study (16 U.S.C. 759)

Authorizes a comprehensive and continuing study of the shad of the Atlantic coast for the purpose of recommending to the Atlantic Coast States, through the Atlantic States Marine Fisheries Commission, measures to be taken to arrest decline, increase the abundance, and to promote the wisest utilization of such shad resources.

63 Stat. 616 Public Law 249, 81st Cong. Act of August 18, 1949

Whaling Convention Act of 1949 (16 U.S.C. 916-916 1)

Provides for the licensing, enforcement of regulations, and research to assist the International Whaling Commission established by the International Convention for the Regulation of Whaling signed at Washington December 2, 1946.

64 Stat. 421 Public Law 676, 81st Cong. Act of August 9, 1950

Atlantic Coast Fish Study for Development and Protection of Fish Resources (16 U.S.C. 760a-760c)

Authorizes a comprehensive and continuing study of species of fish of the Atlantic coast, including bays, sounds, and tributaries, for the purpose of recommending to the States of the Atlantic coast appropriate measures for the development and protection of such resources and their wisest utilization, whether for sport or commercial fishing or both.

64 Stat. 474 Public Law 730, 81st Cong. Act of August 25, 1950

Tuna Conventions Act of 1950 (16 U.S.C. 951-961)

Provides for the appointment of Commissioners and Advisory Committees for the International Commission for the Scientific Investigation of Tuna and the Inter-American Tropical Tuna Commission. Authorizes the approval or disapproval of annual programs of the Commissions and regulations of the Commissions requiring the submission of records of operations by persons participating in the fishery covered by the Conventions. Authorizes cooperation of Federal agencies with the Commissions in the conduct of scientific programs. (The International Commission for the Scientific

Investigation of Tuna is not active.) The Act of October 15, 1962, amending the Act of September 7, 1950, authorizes the Secretary of the Interior to issue regulations to carry out recommendations of the Inter-American Tropical Tuna Commission, upon approval of such recommendations by the Secretaries of State and Interior, concerning proposals designed to keep the populations of tuna at levels of abundance which will permit the maximum sustained catch. Regulations may also be issued with the concurrence of the Secretary of State prohibiting the entry into the United States of fish from any country whose vessels are being used in a manner that tends to diminish the effectiveness of the Commission's conservation recommendations.

64 Stat. 777	Public Law 764, 81st Cong.	Act of September 7, 1950
76 Stat. 923	Public Law 87-814	Act of October 15, 1962

The Defense Production Act of 1950 as implemented by Executive Order 10161, dated September 9, 1950; Executive Order 10480, dated August 14, 1953; Defense Food Delegation No. 2; and Defense Food Delegation No. 2, Revision 1 (50 App. U.S.C. 2153; 3 CFR 1949-1953 Comp., p. 339; 3 CFR 1949-1953 Comp., p. 962; 15 F.R. 6998; 16 F.R. 3311, 3519; 17 F.R. 2369)

Pursuant to the Defense Production Act, the President may delegate any power or authority conferred upon him by that Act to any officer or agency of the Government and he may authorize such redelegations by that officer or agency as the President may deem appropriate. By Executive Order, the President delegated his authority to the Secretary of Agriculture with respect to food. The Secretary of Agriculture then redelegated his authority relative to the defense functions concerning fishery products to the Secretary of the Interior.

64 Stat. 816	Public Law 774, 81st Cong.	Act of September 8, 1950
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(Successive Acts have extended the termination date of the Act of September 8, 1950.)

Northwest Atlantic Fisheries Act of 1950 (16 U.S.C. 981-991)

Authorizes enforcement of the provisions of the International Convention for the Northwest Atlantic Fisheries (ICNAF)

64 Stat. 1067	Public Law 845, 81st Cong.	Act of September 27, 1960
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Executive Order No. 10082, October 5, 1949, 14 F.R. 6105, amended by Executive Order No. 10170, October 12, 1950, 15 F.R. 6901, amended by Executive Order No. 10741, November 26, 1957, 22 F.R. 9451 (19 U.S.C. 1351 Note)

The Executive Order No. 10082, as amended by Executive Order No. 10170, provides the Department of the Interior with representation on the Interdepartmental Committee on Trade Agreements and the Committee for Reciprocity Information. Executive Order No. 10741 established the Trade Policy Committee, which includes membership by the Department of the Interior. This Committee makes recommendations to the President on basic policy issues arising in the administration of the trade agreements program, which, as approved by the President, shall guide the Interdepartmental Committee on Trade Agreements. The Bureau of Commercial Fisheries participates in the development of departmental positions in tariff and foreign trade problems affecting fishery products as well as in the work of subcommittees of the Interdepartmental Trade Agreements Committee.

Act of July 1, 1954, as amended (sometimes known as the Saltonstall-Kennedy (S-K) Act of 1954) (15 U.S.C. 713c-3; 16 U.S.C. 742e; 23 F.R. 2304)

Directs the Secretary of Agriculture to transfer annually to the Secretary of the Interior, from funds made available under the terms of the Agricultural Adjustment Act of 1935, an amount equal to 30 percent of the gross receipts from customs duties collected on fishery products. Such funds are to be used by the Secretary of the Interior to promote the free flow of fishery products by conducting a fishery educational service and research program including the use of vessels or other facilities; to develop and increase markets for fishery products (see Fishery Educational Service and Market Development, *supra*); and to conduct various types of research pertaining to American fisheries. The Secretary is also authorized to acquire and dispose of surplus fishery products (see Acquisition and Disposal of Surplus Fishery Products, *supra*).

68 Stat. 376	Public Law 466, 83rd Cong.	Act of July 1, 1954
70 Stat. 1122, 1124	Public Law 1024, 84th Cong.	Act of August 8, 1956

North Pacific Fisheries Act of 1954, as amended (16 U.S.C. 1021-1032)

Authorizes cooperation in the conduct of scientific and other programs at the request of the International North Pacific Fisheries Commission and the enforcement of the International Convention for the High Seas Fisheries of the North Pacific Ocean to which the United States, Canada, and Japan are parties.

68 Stat. 698	Public Law 579, 83rd Cong.	Act of August 12, 1954
71 Stat. 310	Public Law 85-114	Act of July 24, 1957

Agricultural Trade Development and Assistance Act of 1954, as amended (sometimes known as Public Law 480) (7 U.S.C. 1704(k))

The Act authorizes the use of foreign currencies which accrue from the sales of surplus agricultural commodities for the conduct and support of scientific activities overseas and to collect, collate, translate, abstract, and disseminate scientific and technological information. This particular authorization requires that there be specific appropriations for the use of such foreign currencies. The Bureau of Commercial Fisheries received its first appropriation under this authority in the budget for the fiscal year ending June 30, 1962.

68 Stat. 456	Public Law 480, 83rd Cong.	Act of July 10, 1954
72 Stat. 275	Public Law 85-477	Act of June 30, 1958

Great Lakes Fishery Act of 1956 (16 U.S.C. 931-939c)

Authorizes research and control measures for control of lampreys in the Great Lakes by the United States Section of the Great Lakes Fishery Commission established under the provisions of the Convention on Great Lakes Fisheries between the United States and Canada. The Secretary of the Interior is authorized to transfer to the United States Section any lamprey control project or works under his jurisdiction and to act for or on behalf of the United States in the exercise of the powers granted by the Act.

70 Stat. 242	Public Law 557, 84th Cong.	Act of June 4, 1956
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Fishery Education (16 U.S.C. 760d; 20 U.S.C. 15j (a) (5))

Authorizes grants to educational institutions to promote education and training of scientists, technicians and teachers needed in the field of commercial fishing. Also amends the Vocational Education Act of 1946 to authorize assistance to States and Territories in the development of vocational education in the fishery trades and industry, such assistance to be apportioned as determined by the United States Commissioner of Education after consultation with the Secretary of the Interior.

70 Stat. 1126

Public Law 1027, 84th Cong. Act of August 8, 1956

Fish and Wildlife Act of 1956 (16 U.S.C. 742a-742d, 742e-742k; 15 U.S.C. 713c-3(e); 15 U.S.C. 713c-3 Note; 23 F.R. 2304)

Establishes a comprehensive national policy on fish and wildlife resources; reorganizes the Fish and Wildlife Service; establishes a fishery loan fund and authorizes the Secretary to make loans for financing and refinancing of operations, maintenance, replacement, repair, and equipment of fishing gear and vessels and for research into the basic problems of fisheries (Act of September 13, 1961, P. L. 87-219, authorizes repair, sale, etc., of personal property acquired in connection with the fishery loan program); the administration of a program of fishing-vessel mortgage insurance as provided for in Title XI of the Merchant Marine Act of 1936, as amended (46 U.S.C. 1271-1280); and under provisions of Title V of the Merchant Marine Act of 1936, as amended (46 U.S.C. 1151-1161(o)), to make loans to aid in the construction of fishing vessels; creates in the Secretary of the Interior, or his designees, consultative and representative responsibilities in international relations involving fishery matters; authorizes a program of Fishery Educational Service and Market Development (see entry under this heading, supra); authorizes the Acquisition and Disposal of Surplus Fishery Products (see entry under this heading, supra); authorizes the Secretary to foster research, investigation, and experimentation to determine the best methods for processing, packaging, transporting, distributing, and marketing fish and fishery products, including but not limited to the development and promulgation of grade standards and the inspection and certification of fish and fishery products; and improvement of transportation facilities and rates for fish and shellfish and any products thereof as provided for in Title II of the Act of August 14, 1946, popularly known as the Agriculture Marketing Act of 1946, as amended (7 U.S.C. 1621-1627); authorizes the collection and dissemination of information of all kinds to the public, to the President, and to Congress, concerning the commercial fishing industry and its products; authorizes investigations and reports with respect to the competitive aspects of domestic and foreign produced fish and fishery products; authorizes programs and investigations that may be required for the development, advancement, management, conservation and protection of the fishery resources of the United States and the competitive economic position of the various fish and fishery products with respect to each other, and with respect to competitive domestic and foreign-produced commodities.

70 Stat. 1119

Public Law 1024, 84th Cong.

Act of August 8, 1956

72 Stat. 1710

Public Law 85-888

Act of September 2, 1958

75 Stat. 493

Public Law 87-219

Act of September 13, 1962

75 Stat. 788

Public Law 87-367

Act of October 4, 1961

Fishery Research for Commercial Production of Fish on Flooded Rice Areas (16 U.S.C. 778-778c)

Authorizes research and experimentation to develop methods for the commercial production of fish on flooded rice acreage in rotation with rice field crops.

72 Stat. 35

Public Law 85-342

Act of March 15, 1958

Study of Effects of Insecticides on Fish and Wildlife (16 U.S.C. 742d-1; 16 U.S.C., 1958 Ed., Supp. I, 742d-1 Note)

Authorizes comprehensive continuing studies on the effects of insecticides, herbicides, fungicides, and pesticides upon the fish and wildlife resources of the United States to determine the amounts, percentages, and formulas of these chemicals that are lethal to or injurious to fish and wildlife and thereby prevent losses of fish and wildlife from their use.

72 Stat. 479

Public Law 85-582

Act of August 1, 1958

73 Stat. 563

Public Law 86-279

Act of September 16, 1959

Investigation and Eradication of Dogfish Sharks (16 U.S.C. 758a Note)

Authorizes for no more than 4 years investigations of the abundance and distribution of dogfish sharks, experiments to develop control measures, and a program for the elimination and eradication or development of economic uses of dogfish shark populations.

72 Stat. 1710

Public Law 85-887

Act of September 2, 1958

Research Grants to Institutions of Higher Education and Scientific Research Organizations (42 U.S.C. 1891-1893)

Authorizes basic scientific research grants to non-profit institutions of higher education or to nonprofit organizations whose primary purpose is the conduct of scientific research, when such grants are deemed to be in furtherance of agency objectives; provides for discretionary authority to vest in such institutions or organizations, title to equipment purchases with grant or contract funds, if in furtherance of agency objectives; and requires an annual report on such grants to the appropriate committees of both Houses of Congress.

72 Stat. 1793

Public Law 85-934

Act of September 6, 1958

Fishery Attache Program, Executive Order No. 10249, June 4, 1957, 16 F.R. 5309, and Memorandum of Understanding Between the Departments of State and Interior with Respect to the Minerals and Fisheries Officer Program, dated May 5, 1959 (16 U.S.C. 742d; 16 U.S.C. 742e(c); 22 U.S.C. 846; 22 U.S.C. 846 Note)

Recognizing its responsibility to service the foreign reporting needs of other Federal agencies, and the particular needs of the Department of the Interior in the Fishery field, the Department of State in consultation with the Department of the Interior and other interested Government agencies is developing appropriate schedules and more comprehensive guidance materials for mineral and fishery reports. The Department of

State has also agreed to request funds for Fisheries and Minerals Officer positions at those posts which are determined by the Department of State, in consultation with the Department of the Interior, to require such positions. These Officers are responsible for discharging in their respective fields the economic and technological reporting requirements for the country in which they are stationed. To date, Fishery Attaches have been appointed to Copenhagen, Denmark; Tokyo, Japan; and Mexico City, Mexico.

60 Stat. 1002	Public Law 724, 79th Cong.	Act of August 13, 1946
70 Stat. 1121	Public Law 1024, 84th Cong.	Act of August 8, 1956

Fishing Vessel Construction Differential Subsidy (46 U.S.C. 1401-1413)

Authorizes the Secretary to pay up to one-third of the cost of construction of a fishing vessel based upon the difference between foreign and domestic costs of construction if the vessel, the owner, and the fishery in which it is to be used meet certain standards or situations. The law provides that applications for this aid will not be received after June 12, 1963.

74 Stat. 212	Public Law 86-516	Act of June 12, 1960
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Fishing Vessel Mortgage Insurance (46 U.S.C. 1275 Note)

Provides that the Secretary of the Interior may exercise authority relating to the issuance of Federal ship-mortgage insurance on fishing vessels comparable to that of the Secretary of Commerce under the Merchant Marine Act of 1936, as amended (46 U.S.C. 1271-1280) by reason of the transfer of authority to the Secretary of the Interior under the provisions of the Fish and Wildlife Act of 1956 (16 U.S.C. 742e).

74 Stat. 314	Public Law 86-577	Act of July 5, 1960
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Cooperative Research Units (16 U.S.C. 753a-753b)

Authorizes the Secretary to continue to enter into cooperative agreements with colleges, universities, State fish and game departments, and with nonprofit organizations relating to cooperative research units by assigning Department of the Interior technical personnel for service with such units, by supplying units with equipment that may be available for such purposes, and by paying the incidental expenses of Federal personnel and employees of cooperating agencies assigned to the units.

74 Stat. 733	Public Law 86-686	Act of September 2, 1960
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Construction of a Shellfisheries Research Center at Milford, Connecticut (16 U.S.C. 760h-760i)

Authorizes the Secretary of the Interior to construct at Milford, Connecticut, a research center for shellfisheries production consisting of research facilities, a pilot hatchery including rearing ponds and tanks, and a training school.

75 Stat. 409	Public Law 87-173	Act of August 30, 1961
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Authorizes the Secretary of the Interior, with respect to States where he finds excessive oyster mortality presents an immediate and substantial threat to industry economic stability, to acquire oyster brood stock resistant to the disease causing the mortality, and to distribute such brood stock to the States concerned in accordance with cooperatively developed plans, provided the participating States pay one-third of the cost of the program. Also authorizes the making of grants to such States to assist in the financing of research and other activities necessary in the development of disease-resistant strains of oysters, provided the participating States agree to use an additional amount for such purposes equal to at least 50 percent of the grant.

76 Stat. 356

Public Law 87-580

Act of August 9, 1962

