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REPORT OF THE BUREAU OF COMMERCIAL FISHERIES

FOR THE CALENDAR YEAR 1968

UNITED STATES GOVERNMENT PRINTING OFFICE
WASHINGTON • 1970

National Oceanic and Atmospheric Administration

Report of the United States Commissioner of Fisheries

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FOREWORD

The many and varied activities of the Department of the Interior's Bureau of Commercial Fisheries to conserve the Nation's food fishes are summarized in this annual report.

These activities include basic research to gain knowledge of the fish we harvest and their environment so that we may use them wisely for the benefit of our people.

The Bureau also seeks ways to make better use of the fish once they are harvested, by improving methods of processing and marketing.

And it administers a loans-and-grants program to give direct economic assistance to fishermen, as well as a financial aid program that assists State fish and game agencies in their administration of commercial fisheries.

Rapid deterioration of the aquatic environment—both fresh water and marine—demands the attention of everyone, and the Bureau of Commercial Fisheries is giving its full cooperation to all agencies involved in these ecological problems.

Walter J. Hickel

WALTER J. HICKEL,
Secretary of the Interior.

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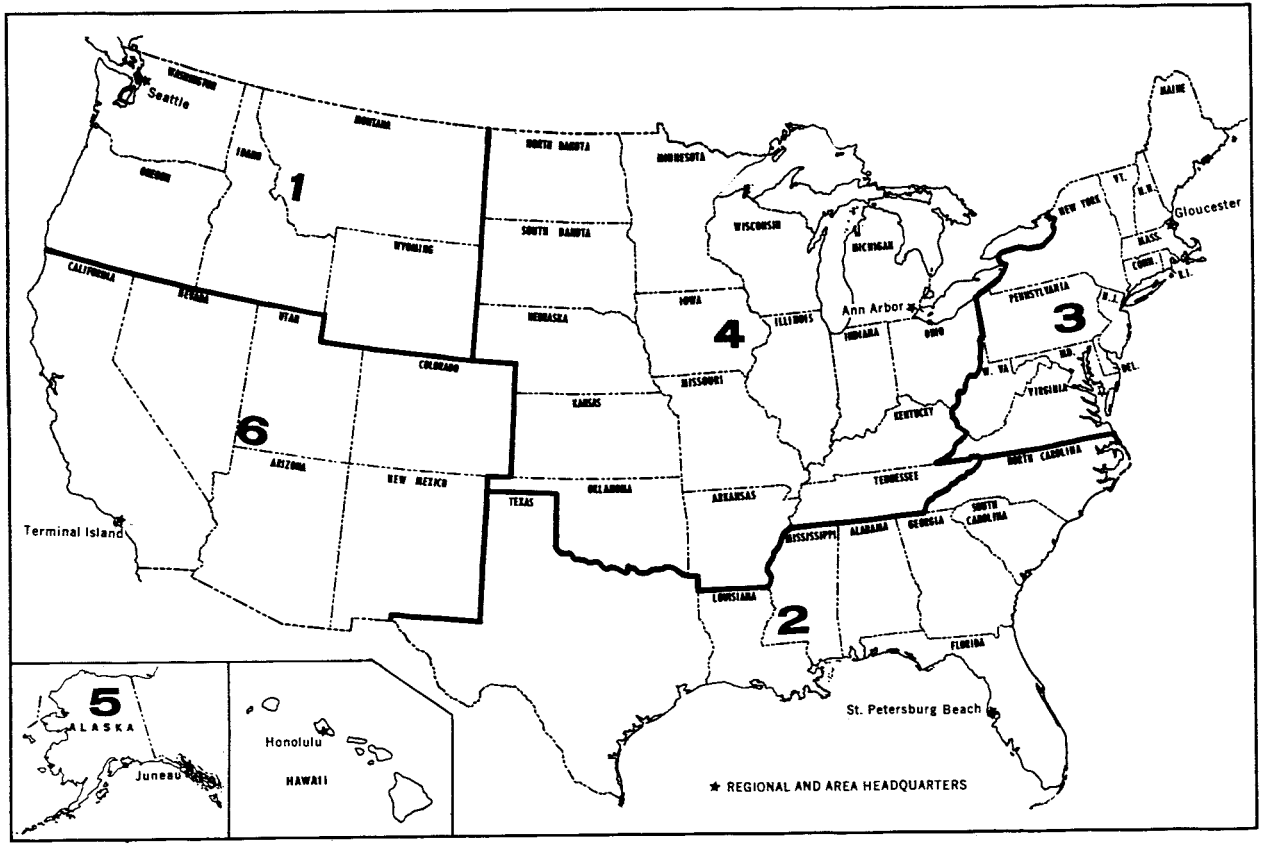

Frontispiece.—Regional and Area boundaries, Bureau of Commercial Fisheries, December 31, 1968.

Report of the Bureau of Commercial Fisheries For the Calendar Year 1968

This 12th annual report of BCF (Bureau of Commercial Fisheries) is made in compliance with section 9(a) of the Fish and Wildlife Act of 1956. This act created the U.S. Fish and Wildlife Service, which comprises the Office of the Commissioner of Fish and Wildlife and two Bureaus: BCF, which is responsible for commercial fisheries, including whales, seals, and sea lions; and the Bureau of Sport Fisheries and Wildlife, which is responsible for wild birds, mammals (except those marine mammals that are the responsibility of the BCF), and sport fisheries. The Service is part of the organization of the Assistant Secretary for Fish and Wildlife, Parks, and Marine Resources.

Information on projects undertaken in 1968 under the Saltonstall-Kennedy Act of July 1, 1954, is combined with other activities in this report. Before 1966 the Saltonstall-Kennedy projects were reported separately.

The United States in 1968 was in sixth place among the fishing nations of the world, being exceeded by Peru, Japan, U.S.S.R., China (mainland), and Norway. Until 1957 the United States ranked second, under Japan, among the major fishing countries. During the last 10 years, the world catch (live weight) increased 74 percent and the catch of the five now most important countries increased 94 percent. From 1959 to 1968 the U.S. catch declined 16 percent.

The fishing industry is made up of as many segments as there are fisheries—each segment is an industry within itself. Even the segments have parts or sectors, such as the producers (fishermen and boat-owners), the processors, and the distributors. Processors and sellers of imported products are also part of the fishing industry. Each segment or part has its own interests and problems, and these may differ widely. The present condition of U.S. fisheries or their sectors varies from record prosperity to severe depression.

During 1968, many writers pointed out that the United States has fallen from second to sixth place in world fishery production. This

fact usually is cited as if it were a disgrace for the United States to be in sixth place. The rank of the United States in world fisheries production is much less important than the economic condition of U.S. fisheries. If it could be said that the U.S. domestic fishing industry had found it economically possible to expand its production to supply the U.S. demand for fishery products, BCF would be satisfied, even if the United States ranked 25th as a fisheries nation. Although the United States was sixth in the number of pounds of fish landed, it was second only to Japan in value of catch.

In recent years the United States has not expanded its production. It has less than 6 percent of the world population, but it consumes about 11 percent of world fishery production. U.S. per capita utilization of fish has increased almost 100 percent since 1957. The United States has the most attractive fishery market in the world, yet it supplies less than 30 percent of the U.S. demand from the catch of its vessels. Of even more concern is the apparent trend in production. The U.S. domestic catch in 1968 dropped nearly 17 percent by weight below the 1960 catch. The fact that some of the U.S. fisheries have flourished is further evidence that U.S. fisheries are separate industries.

A look at present conditions in some established fisheries from the point of view of the producer and the processor follows.

In New England, some of the major segments, such as the haddock fishery, find it difficult to operate at a profit. The haddock resource on Georges Bank, on which the New England industry depends heavily, has suffered from a series of years when survival of young was poor. The last successful spawning (1963), which could have carried the haddock industry through the later years of poor survival, was hit hard by the massive U.S.S.R. fleet just when the fish were large enough to be caught. In the market place, as well as on the fishing grounds, New England producers are facing severe competition from imported fishery products and from domestic food products.

In the Middle and South Atlantic area in 1968, the menhaden industry showed a slight improvement over 1967, which was one of its poorest years. Young menhaden were more abundant along the Atlantic coast in 1968 than in 1967. Because the Atlantic fishery is made up of older fish, the 1968 year class will not materially contribute to the 1969 catch.

Although the Gulf of Mexico catch of shrimp in 1968 was 11 percent below the 1967 catch, the 16-percent increase in exvessel prices caused the value of the domestic shrimp fishery to exceed $100 million for a second consecutive year. This increase made the shrimp fishery the most valuable fishery of the United States.

For the Pacific Southwest, 1968 was again a successful year. Although the catch was slightly below that of 1967, the value to fishermen was slightly more. In compliance with the recommendations of the Inter-American Tropical Tuna Commission, the 1968 quota of yellowfin from the regulatory area off California to the central coastline of Chile was held to 106,000 short tons. The fishery closed June 18, 1968. A reported eight tuna vessels shifted operations to the eastern Atlantic after the Pacific area was closed and found excellent fishing off West Africa. Fishermen were assisted by the BCF research vessel *Undaunted*, which spent most of 1968 off West Africa where it was able to transmit to the U.S. fleet the on-the-spot information about locations of tuna.

In the Pacific Northwest in 1968, the catch of halibut of 48.4 million pounds (dressed weight) was well below the quota of 58.5 million pounds set by the International Pacific Halibut Commission. This was the second consecutive year the catch failed to reach the quota. The catch was 7.1 million pounds less than in 1967 and the smallest since 1936 when the quota was 48.0 million pounds.

Many factors contributed to the sharply reduced 1968 halibut catch. The halibut stocks, particularly in Area 2, failed to respond to catch reductions made in recent years. In addition, low exvessel prices so discouraged fishing for halibut in 1968 that the Canadian-American fleet operated with 307 vessels compared with 400 vessels in 1967. Prices paid to fishermen in 1967 were much less in 1966 and were even lower during the first part of the 1968 season. Many vessels left the halibut fishery to fish for more profitable species such as salmon and albacore tuna.

In Alaska, the salmon fishery in 1968 improved greatly over the small catch and pack of 1967. The salmon catches were generally good everywhere in the State. The pink salmon fishery, at a near record low in 1967, yielded a normal cycle year catch of 105 million pounds in 1968. Southeastern Alaska had excellent runs of pink salmon, although the small size of the fish (2.8–3.5 pounds compared to a normal 4.2–4.4 pounds) yielded a smaller canned pack than would have been realized from average-size fish. Good catches of sockeye, chum, and pink salmon were made in central Alaska. Total landings of Alaska salmon were the highest since 1944, and the catch of coho salmon was the largest since 1964. Chinook salmon fishing remained relatively stable in 1968.

In the Great Lakes in 1968 the landings of alewives totaled 27 million pounds—a decline from the 41 million pounds landed in 1967. No other species of fish in the Great Lakes was landed in greater quantity. The alewives dominated the fishery in 1968 only in volume landed.

While older, established fisheries in the United States were experi-

encing success mixed with failure, some new fisheries appeared and other comparatively new ones expanded. The new Alaska scallop fishery continues to attract attention because of the high rate of catch and the price of the product. Some boats caught more than 45,000 pounds of shucked scallops in 10 days—at a landed price of over $1 per pound. Whether the resource is large enough to sustain this level of fishing is a question that scientists are asking.

Off the Maine coast the northern shrimp fishery continues to grow.

These and other new fisheries have contributed to the total U.S. catch. Had it not been for their development, U.S. production would have declined even more. Over the recorded history of U.S. fisheries, the catch has been maintained by constantly seeking new species or new stocks. Yet, while our catches have remained static or declined over the past 10 years, foreign vessels have taken more and more fish off U.S. coasts. In 1968, the foreign catch in waters adjacent to U.S. coasts was estimated to have continued at about the same level as in 1967—7 billion pounds—which is more than the total U.S. catch.

The established and new fisheries referred to are composed of only a few of the species that make up the total U.S. fishing industry, but they represent a fair sample. From these few examples it should be clear that a generalization about the condition of the U.S. fishing industry is impossible.

Although segments of the U.S. fisheries vary greatly in many respects, some of their problems are identical:

1. Many are feeling the effects of declining resources resulting, at least in part, from foreign competition.

2. A number of fisheries are plagued with resource failures because of problems that the United States has brought on itself. Pollution and destruction of estuaries are taking their toll of some of the U.S. fishery resources.

3. Some fisheries are finding it increasingly difficult to compete with imported fishery products as well as a variety of attractive protein products from other domestic sources.

These major fishery problems can be solved by the following courses of action.

1. Foreign competition for the resource is a difficult problem. In the near future, however, a solution must be found. By some means, international management must be put into effect, and the special interests that coastal nations have for the resources off their coasts must be protected. Many people are seeking a solution to this problem.

2. Resource failures, even within U.S. waters, will never be eliminated completely as long as U.S. fishermen harvest wild species that depend on favorable oceanographic conditions for survival. Yet the

prevention of resource destruction caused by unwise acts of man is possible. Action to save the resources will be taken when the public becomes sufficiently concerned about effects of pollution and destruction of estuarine areas. Whether this action will come soon enough to save many species of fish is anyone's guess.

3. Foreign competition in some U.S. markets can be met by only two methods: (1) some form of assistance to the domestic industry to compensate for subsidies by foreign governments and (2) lowering the cost of producing domestic fishery products. Possible means of reducing costs center around the mechanization of locating, harvesting, and processing and the elimination of economic barriers, such as illogical regulations that hamper production of domestic fishery products.

In common with the producer, the processing segment of the U.S. fishing industry has no single answer to its problems. Processors, however, are generally in much better economic shape than producers. Their position is much more flexible in regard to supply and prices of raw material and in prices received for their finished products. But even within the same fishery some processors are successful in finding ready markets for their products at acceptable prices, whereas others find it difficult to make a profit.

Some processors operate modern, efficient, and well-managed plants that are comparable with the best in any other food industry in the United States. Their products have a quality that anyone could take pride in. Other processors of fishery products cannot boast of the same efficiency, and the quality of their products is not high. In many instances, quality is sacrificed for profit. This type of processor tends to tarnish the image of the entire fishing industry, weakens the demand for fishery products in general, and eventually puts himself out of business.

Has there been any improvement in quality over the past few years? Yes, because more and more companies are producing better products. But inferior products are still on the market and even a small percentage of poor-quality fish hurts the entire industry because it creates uncertainty in the mind of the consumer. Eliminate this uncertainty, and per capita consumption will rise. Perhaps this can be done through development and promotion of an identification shield used by processors dedicated to quality. The only certain method, however, is through mandatory inspection.

Millions of pounds of fish are inspected each year under the BCF voluntary inspection program, paid for by the producers. The fishery products of these companies are of high quality when they leave the plants. The program, however, has one shortcoming: It cannot be used

by the entire industry because only those plants producing a substantial volume can afford the inspection program. Although BCF has not found a formula that would make the voluntary inspection program available to small plants, it is still seeking one.

If mandatory inspection of fish and fishery products should come to the United States, and BCF believes it will, there will be hardships for some companies and some vessel owners. If the mandatory inspection program is a reasonable one and the industry can weather the first few years of its operation, the entire industry will benefit.

Some few fishing vessels and some few processing plants are not the only ones responsible for loss of quality. Fresh or frozen seafood is handled improperly at distribution outlets. Fishery products stored at distribution plants at temperatures far too high to maintain proper quality neutralize the effect of quality control at the plant. Any program designed to ensure wholesome and high-quality products for the consumer must consider all steps in product handling from the time the fish is caught until the product is in the hands of the consumer.

The price and the demand for fishery products today have caused an unusual situation. Some luxury products, such as king crab and shrimp, are enjoying an unprecedented demand. Even with substantial price increases, demand exceeds supply. But while some luxury products enjoy this success, the "bread and butter" products, such as groundfish, are in trouble. There have been many explanations for this situation. Perhaps it is the quality, the flavor, the effect of promotion, the ease of preparation, or the desire of the consumer for something new in food that has influenced demand. Perhaps all of these have had an effect. It appears that one of the greatest potential improvements in the industry is product development. Not just a slight modification, but a new product developed from U.S. low-priced fish, such as cod and whiting, or from some underutilized species, such as hake and herring. Some will say it is not possible. BCF does not agree, for all of these species can be the basis for an excellent food. The protein of such fish is unequaled, and the texture is desirable.

BCF predicts that in time a completely new fishery product will be developed—one that is such a "natural" that it will be accepted immediately. In this era of unbelievable technical developments, who can say that this is impossible?

Who will develop these products? So far the Federal Government has stayed out of this type of research except by special invitation from a specific segment of an industry facing a particular problem. If the fishing industry can do the job, it should. If industry cannot handle it alone, perhaps it should call on the Federal Government for assistance. BCF is prepared to join industry in seeking new types of

fishery products—products that will allow upgrading of some of the lower priced species, or using some of the unutilized raw materials off U.S. coasts. BCF will join industry in efforts to produce a food product that will be in demand.

The U.S. fishing industry is not a sick industry. Some segments, it is true, are in trouble, in many instances through no fault of their own. Other parts of the industry are progressive and profitable. It is possible that the entire industry could be upgraded if the problems faced by industry could be properly identified; effective solutions could then be proposed. To do this, BCF is suggesting a master plan that BCF hopes will become a joint effort of industry (producers and processors), States, universities, the Federal Government, and any organization interested in fisheries. BCF will arrange meetings with all groups interested in a particular fishery, such as that for New England groundfish, to attempt to reach agreement on program priorities. By seeking the advice of those who have worked in or with each segment and part of the industry, BCF should continue to be able to make real progress.

The aims of BCF are several. BCF tries to increase the contribution that the aquatic living commercial resources make to the Nation's economy. It aims to increase the efficiency of the fisheries so that the economic status of those engaged in the fishing industry is improved. It tries to help fill the growing demand that the American people have for fish and shellfish products. Still other aims are to seek means of bringing more of the world's aquatic resources into economic production for benefiting all mankind and to contribute to man's understanding and control of aquatic living resources and their environment.

BCF has a number of responsibilities. It is responsible for developing and managing programs to define the problems of the commercial fisheries and propose solutions that will contribute the most toward achieving BCF aims; for administering programs to provide services to those engaged in the commercial fishing industry; for developing and implementing policies on international fishery matters including negotiation of treaties and agreements; and for administering grant-in-aid programs to States to assist in developing and improving the commercial fisheries.

To achieve its national aims in 1968, BCF engaged in many activities. Some activities concern investigations on salmon, shad, striped bass, and other anadromous fishes; on passage of fishes over and around dams and other obstructions; and on sea lions, seals, and whales; and on life histories, migrations, and population dynamics of important species. Other activities concern studies of marine fishery stocks, including bottomfish, sardines, and tunas. BCF also studies marine species of crustaceans, such as crabs, lobsters, and shrimp, and mollusks, prin-

cipally clams and oysters, and their enemies, including diseases, boring snails, and starfish. Still other activities concern certain fresh waters. BCF studies the Great Lakes and other inland waters to acquire knowledge needed to maintain fishery resources there at high levels of productivity. Programs are also established on public lands in conjunction with State agencies in interstate and other type waters. Work includes studies of the effect of environment, fishing, and water-use projects on production of fish.

BCF is active in its efforts to help the economy of the fisheries. It performs research directed toward assessing, developing, and increasing the economic use of fishery resources. As required by various statutes, including the Fish and Wildlife Act of 1956 and other laws, BCF analyzed various economic aspects of production, distribution, and consumption of fishery products. BCF assumed Department of Interior responsibilities under the Fishery Cooperative Marketing Act of 1934 and responsibilities for improving transportation facilities and rates for fish and shellfish and any fishery products. In domestic and international economies, BCF promoted the interests of the Nation and the fishing industry. To Congress, other Government agencies, and the general public, BCF furnishes advice and consultation and provides detailed information and recommendations on economic problems. In accordance with established policy, BCF develops legislation designed to resolve fundamental economic problems of the industry. BCF also has a market news service that collects, analyzes, and publishes current information and statistics on fishery commodities.

Through its industrial research BCF also helps maintain the welfare of the U.S. commercial fisheries. Investigations were made to improve and develop methods for catching, handling, processing, preserving, storing, transporting, and marketing fishery and industrial products. BCF also studied the composition, properties, and nutritive value of fishery products; developed and improved the methods for cooking fish and provided advisory and inspection services to improve or correct fish-processing practices. Other activities were exploratory and experimental fishing to determine the character, extent, and availability of resources and to devise, test, and demonstrate the most effective types of gear and vessels. Other efforts developed and increased the markets for domestic fishery products by helping industry solve its problems of production, distribution, and consumption.

BCF also formulated and implemented policy on international fishery matters. It reviewed and coordinated international foreign activities and interests of the Department of the Interior in commercial fisheries. It collected and disseminated data on foreign fisheries and collaborated with AID (Agency for International Development), an

agency of the U.S. Government, the United Nations, and the Food and Agriculture Organization in their programs of technical assistance to developing countries.

Other various activities were carried on. To promote and aid development of U.S. commercial fisheries, BCF supervised a Federal aid program, a fisheries loan program, a fishing vessel mortgage and loan insurance program, and a fishing vessel construction differential subsidy program. It was active in the Columbia River Fishery Development Program, a cooperative effort with State agencies; in the coordination and reporting on water resource developments that affect commercial fishing; in the design and inspection of fish protective devices; in the management of fur seals in the North Pacific; and in the implementation of laws and regulations relating to management of commercial fisheries, whales, and seals, pursuant to international agreement.

CONDITION OF THE FISHERIES

U.S. fishermen caught 4.1 billion pounds of fishery products in 1968 for which they received $471.5 million at exvessel level—$31.9 million above the previous year and nearly equal to the record $472.4 million paid for the larger 1966 catch (4.4 billion pounds). The 1968 catch was only 2 percent above that of the previous low-volume year and the second smallest domestic catch since 1942. (Record catch—5.4 billion pounds in 1962.)

There were sharp declines in landings of anchovies, haddock, Pacific hake, tuna, blue crabs, and king crabs; and diminished catches of alewives, Pacific halibut, and shrimp. Increased landings of menhaden, Pacific salmon, sea herring, jack mackerel, and yellowtail flounders prevented the domestic landings from going even lower. There were record catches of albacore tuna in Oregon, both northern and spiny lobsters, and Maine and Oregon shrimp.

Fishermen were paid an average of 11.46 cents per pound in 1968, establishing a new record and well above the 10.84 cents paid in 1967 and 10.81 cents paid in 1966. Average prices paid to fishermen, as measured by the "Indexes of Exvessel Prices Received by Fishermen," were up 9 percent from 1967 and 24 percent above the 1957–59 average. The index for all finfish prices rose 4 percent in 1958 because of sharp increases in prices for New England finfish and for tuna. Salmon prices increased moderately. Prices paid for all shellfish increased 13 percent in 1968. Prices for shrimp increased 6 percent while prices for all other shellfish rose 19 percent. Industrial fish was the only major

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category to decline in 1968. Although landings of certain items, such as tuna, shrimp, blue crab, and king crab were less than in 1967, the total value paid to fishermen was much higher.

The 1968 value of processed fishery products produced in this country from both domestic and imported raw material was $1.3 billion—about 7 percent above that of 1967. The canned pack of 43.4 million standard cases had a record value of $580.6 million. There were record packs of tuna and animal (pet) food and large increases in the canned production of Pacific salmon, shrimp, Maine sardines, and jack mackerel. The remarkable fish stick and portion industry set new records for volume and value—production was 270.7 million pounds valued at $108.8 million. Processors of breaded shrimp turned out 103.7 million pounds valued at a new high of $98.5 million. The volume of groundfish fillets was less than in 1967, but producers of other kinds of fillets had a relatively good year. Products from fish and shellfish were in greater volume, and all reports point to continued growth in this industry. Cold storage holdings of frozen fishery products reached an alltime high of 288 million pounds on October 31, 1968.

Late in 1966, Bishops of the Roman Catholic Church announced the end of meatless Fridays. The opinion of the industry was divided on how this would affect seafood sales. The effects of this decree have not been assessed completely, but some facts are available. It is true that many segments of the industry still have economic problems, yet other parts of the industry were healthy at the end of 1968. Fishermen received a high dollar value for their catch, and excellent gains were made in the fish-processing industry. Moreover, Americans ate more seafood in 1968 and they paid about 2 percent more at retail levels. Civilian per capita consumption of fishery products increased from 10.8 pounds of edible meat in 1966 and 1967 to 11 pounds in 1968—the highest since 1954. Throughout 1968 the demand continued for some canned products, fish sticks and portions, fillets and steaks, salmon, lobster products, and shrimp items. While the Bishops' 1966 announcement has undoubtedly changed the eating habits of some Americans, a review of the 1968 commercial fisheries trends indicates that it had few if any adverse effects on the overall consumption of edible fishery products in this country.

The above observations on the fisheries of 1968 are based on preliminary data. Appendix A gives a compilation of these data. Final information on the 1968 fisheries will be in "Fishery Statistics of the United States, 1968," and will appear in the U.S. Fish and Wildlife Service Statistical Digest series.

DEVELOPMENTS IN THE FISHERIES

In 1968, certain segments of the domestic fisheries made considerable progress, important Federal legislation affecting fisheries came up for consideration, and international fishery matters continued to concern BCF.

Domestic Fisheries

Important developments occurred in the domestic fisheries in 1968. These developments include a demonstration that an Alaska scallop fishery is commercially feasible, evidence that offshore New England lobsters can be fished effectively with pots, and a continued increase in the shrimp fishery of the Gulf of Maine.

Alaska Scallop Fishery

In 1968, the State of Alaska had its first fishery development project under the Federal Aid Program. In April 1968, the Alaska Department of Fish and Game chartered the F/V *Viking Queen*, a high-line New England scallop vessel, to determine whether a commercial fishery was feasible for Alaska scallops. In the spring, the *Viking Queen*, with a 13-foot New England scallop dredge, made 472 exploratory drags on the Continental Shelf of the Gulf of Alaska. The vessel caught scallops throughout the survey area and located commercially important concentrations east of Cape Saint Elias. Since the *Viking Queen* survey, other commercial scallop vessels have harvested commercial quantities of scallops west of Cape Saint Elias. Preliminary findings from exploratory efforts show that commercial concentrations of Alaska scallops are found most often at depths of 35 to 50 fathoms.

After her survey, the *Viking Queen* began fishing commercially and made a record landing of 47,000 pounds of scallop meats on her first trip. In late June 1968, three additional New England scallop vessels (*Bountiful*, *Ouingondy*, and *Smaragd*) and a converted king crab vessel (*North Pacific*) began fishing out of Seward. During the first 3 weeks of fishing these five vessels landed 256,000 pounds of meats worth over $280,000 exvessel. At least seven vessels were fishing at the end of 1968.

Offshore New England Lobster Fishery

In the spring and summer of 1968, personnel at BCF Exploratory Fishing Base at Gloucester, Mass., demonstrated that it is feasible to use large steel pots to catch offshore New England lobsters that live in deep water. BCF M/V *Delaware* made one good experimental catch in June on the Continental Slope between Shallop and Veatch Canyons in 109 fathoms. Using a string of 11 pots, the scientists

in 24 hours caught 89 lobsters, which weighed 158.5 pounds. The average catch per pot was 14.4 pounds. Experimental catches exceeding 4 pounds of lobsters per pot for fishing time periods of 24 hours or less have been made in depths of 63 to 109 fathoms at various locations, primarily near heads of canyons along the outer edge of Georges Bank. Although lobsters are taken in offshore waters with trawls, some areas cannot be fished with trawls because the bottom is rough.

As a result of this successful demonstration of harvesting, a firm in Gloucester bought pots patterned after those successfully tested by BCF and equipped two vessels for offshore lobster fishing. One vessel landed in Gloucester with over 10,000 pounds of live lobsters, a record for a single trip by a pot-fishing vessel. Previous trips by company vessels had landed not more than 5,700 pounds. The second vessel began fishing in mid-1968.

Shrimp Industry in the Gulf of Maine

A bright spot in the 1968 domestic fisheries was the further development of the northern shrimp industry in the State of Maine. The cold waters off Maine have a substantial resource of this tasty species (*Pandalus borealis*). This fishery started to come into its own in 1965 when 2 million pounds were landed. In 1967, about 7 million pounds were caught, and this quantity was doubled in 1968, when landings were 14.3 million pounds.

Substantial markets were established both domestically and overseas, and about half of the catch was exported. Maine shrimp were originally introduced in Europe by BCF at an international food trade fair in London in 1966. As a result of this promotion, an export market was established and is rapidly expanding. Sweden, at the present time, is the largest customer—a substantial quantity also goes to the United Kingdom. Maine shrimp have also been enthusiastically received in France, Germany, Italy, and the Netherlands. These shrimp are being marketed in many forms including fresh whole shrimp, frozen cooked whole shrimp, frozen uncooked tails, IQF (individually quick frozen) peeled, IQF cooked meats, and frozen uncooked meats in blocks.

Federal Legislation

In 1968, Congress enacted 10 legislative proposals that had some effect on the commercial fisheries of the United States. See appendix B for detailed information and citations concerning these bills.

Two of the 10 acts extended the expiring authority of the Secretary of the Interior. Public Law 90–394 extended the authority for pesti-

cide research to June 30, 1971, and authorized an annual appropriation of $3.5 million for this work. Public Law 90–551 extended to June 30, 1973, the authority for the Secretary to cooperate with the States in carrying out a grant-in-aid program of research and development in the commercial fisheries.

Two other acts provided the Secretary with new authority. Public Law 90–454 authorizes a study and inventory of the estuaries of the Nation. A report to the Congress by January 30, 1970, is to contain recommendations concerning the establishment of a national system of estuarine areas. An annual appropriation of $250,000 is authorized for fiscal years 1969 and 1970. Public Law 90–482 amends a 1954 act that permits the Secretary of State to reimburse vessel owners for fines paid to secure release of vessels that are seized by a foreign country on the basis of rights or claims not recognized by the United States. The amendment permits the Secretary of State to reimburse vessel owners for additional payments to foreign governments in such cases. The new authority for the Secretary of the Interior contained in Public Law 90–482 provides a guarantee system to provide reimbursement to vessel owners for actual damage to vessels, gear, equipment, and dockage fees and utilities and reimbursement to vessel owners and crew members for up to one-half of their gross income lost as a direct result of vessel seizure. To participate in the program, vessel owners will pay a premium set by the Secretary so as to recover the cost of administration of the program and at least one-third of the cost of the guarantee to the Government.

The other six proposals enacted in 1968 are amendments to existing law which affect in some way the interests of commercial fisheries. Public Law 90–341 amends title XI of the Merchant Marine Act of 1936 by eliminating the provisions for a maximum rate of interest of 5 percent (6 percent in certain cases) for guaranteed loans and substituting for such maximum flat rates a determination by the Secretary of Commerce (Interior in the case of fishing vessels) as to what the maximum rate can be. Public Law 90–397 permits a continuation for 5 years of the practice of using fishing vessels to transport fish, supplies, and personnel in the salmon and crab fisheries of Oregon, Washington, and Alaska. Public Law 90–420 is an amendment that updates the Northwest Atlantic Fisheries Act to conform with the present Convention so that it now includes mollusks in the definition of fish and adds mammals to the creatures covered. Public Law 90–427 prohibits foreign vessels to engage in activities in support of a foreign fishing fleet in U.S. territorial waters and the contiguous fishery zone. Public Law 90–549 amends an earlier law so as to permit some flexibility in the use of authorized appropriations for the construction or

leasing of one demonstration plant for the manufacture of fish protein concentrate. Finally, in bringing together in one authorization (Public Law 90–629) all legislation dealing with military sales by the United States to friendly countries, the Congress added a section prohibiting the sale of defense articles or services to any country that seizes, takes into custody, or fines a U.S. fishing vessel engaged in fishing more than 12 miles from the coast of that country. The language of this section permits the President to waive the prohibition if he determines that the sales are important to the security of the United States and promptly informs the Congress of this fact.

International Developments

Developments in foreign fisheries greatly affect the fishing industry and fishery policy of the United States. To assist and protect the fisheries, the United States discussed with U.S.S.R. and Japan bilateral agreements relating to their fisheries off the coasts of the United States. BCF began studies on how the reduced tariffs resulting from the Kennedy Round of GATT (General Agreement on Tariffs and Trade) affect the U.S. fisheries. BCF also analyzed data on foreign fishery trade to measure its effect on the U.S. fishing industry and developed and expanded overseas markets for U.S. fishery products. BCF continued to take an active and leading role in activities of international fishery commissions and at meetings sponsored by the Food and Agriculture Organization of the United Nations and affiliated organizations. BCF also obtained information needed to determine how fishing activities and developments affect the U.S. fishing industry and U.S. Government programs and policies. In cooperation with the U.S. Coast Guard, BCF has enforcement and surveillance operations to ensure that foreign fishing vessels observe various international agreements.

Developments in Foreign Fisheries

Although complete figures are not available for the world catch in 1968, fishery statisticians estimate that the catch was about the same as the record 66 million short tons (live weight) in 1967. The average annual increase in the total catch during the 5 years, 1963–67, was 2.4 million tons. The six major fishing countries (Peru, Japan, China (mainland), U.S.S.R., Norway, and United States), which accounted for about half of the 1967 world catch, had an average annual increase of 1.5 million tons during the 5-year period. Peru and U.S.S.R. registered the greatest increase, followed by Norway and Japan. During the 1963–67 period the U.S. catch declined at an average annual rate of 78,000 tons.

In 1968, the United States held discussions with the U.S.S.R. and Japan concerning the future of the bilateral agreements relating to their fisheries off the coasts of the United States. The United States met with Japan in November and renegotiated two agreements: (1) the May 9, 1967, agreement relating to Japanese operations in the United States contiguous fishery zone in the Northeastern Pacific and (2) the Eastern Bering Sea King Crab Agreement (which was initially concluded in November 1964). In December, United States officials met with representatives of the U.S.S.R. to discuss renewal of the Middle Atlantic Fishery Agreement, which was initially concluded November 25, 1967.

Under the contiguous zone agreement with Japan, the United States is permitting certain traditional Japanese fisheries to continue in the United States' 9-mile fishery zone during specific periods. Japan has agreed to refrain from operating in certain areas on the high seas adjacent to the United States coast so as to avoid damaging United States fixed gear and to give American coastal fishermen an opportunity to fish their regular grounds. In other areas, such as the Pacific Northwest, Japan has agreed to take appropriate measures to fish on the high seas in a manner that will permit the depleted stocks of Pacific ocean perch to be rebuilt.

Under the king crab agreement, Japan accepted a drastic reduction in its annual pack of king crab, from 163,000 cases in 1967 and 1968 to 85,000 cases for 1969 and 1970, and agreed to fish prudently for tanner crab (often called snow crab). Japan's king crab quota was reduced by nearly 50 percent because scientific evidence indicated that the resource was declining.

The Middle Atlantic Agreement with the U.S.S.R. was extended for 2 years. It contains several important modifications. U.S.S.R. agreed to refrain from fishing in an elongated belt about 170 miles long and 20 to 25 miles wide extending offshore from Rhode Island to Virginia. This modification will increase protection provided for depleted species while allowing the fishermen of both countries to have greater access to other species, such as herring, which are abundant offshore. The new agreement also provides that U.S.S.R. will refrain from having specialized fisheries for all flounders (including fluke) and scup. Unchanged were the small areas where the U.S.S.R. may load, unload, or fish within the United States contiguous zone.

Foreign Trade Analysis

The first of five annual tariff reductions, as a result of the Kennedy Round of GATT (General Agreement on Tariffs and Trade), went into effect in 1968. These reduced tariffs, along with increased world

production and a few lower prices, caused a number of requests for import investigations under section 9(b) of the Fish and Wildlife Act of 1956. BCF began section 9(b) studies for groundfish and fish meal.

Foreign Trade Promotion

BCF staff members analyzed data on foreign trade in fishery products to determine how changes in import and export trade affect the U.S. fishing industry.

During 1968, the value of U.S. imports of fishery products was $822.7 million, a gain of 14 percent over the previous record year of 1966. The value of fishery exports was $67.8 million, a decline of $14.5 million from 1967. The value of exports in 1968 was 5 percent under the average for the previous 5 years.

During 1968, BCF developed and expanded overseas markets for U.S. fishery products. Through its Office of International Trade Promotion, BCF participated in four food trade fairs: London, England; Milan, Italy; Munich, Germany; and Paris, France. Seven processors participated in 1968 for the first time in this BCF foreign trade expansion for U.S. fishery products. Their participation makes a total of 65 individual firms that have exhibited their products overseas through the BCF export program since it began in July 1965.

Most U.S. fishery products promoted at these food fairs were frozen; however, some canned products were introduced in Europe for the first time under the BCF program. Canned Maine sardines in the new aluminum flip-top container and canned river herring and roe were among new introductions in 1968 in the overseas market. In addition, frozen eels and frozen seafood chowder were exhibited for the first time at a U.S. food trade fair. Among other fishery items displayed and promoted were canned Alaska and Gulf shrimp, frozen salmon, frozen minced clams, frozen lobsters, frozen oysters, frozen breaded scallops, and frozen Maine shrimp.

Because of the improved economy in many western European countries, BCF estimates that the potential sales of U.S. fishery products in these areas will be $3 million during the next 12-month period.

International Meetings

The more important international meetings in 1968 involving BCF and its personnel were those of Conference on Fishing Vessel Construction Materials, Food and Agriculture Organization of the United Nations, Great Lakes Fishery Commission, Inter-American Tropical Tuna Commission, International Commission for the Northwest Atlantic Fisheries, International North Pacific Fisheries Commission, International Pacific Halibut Commission, International Pacific

Salmon Fisheries Commission, International Whaling Commission, North Pacific Fur Seal Commission, and Western Hemisphere Nutrition Congress II.

International Programs

Important international programs in which BCF participated in 1968 were the United Nations' Codex Alimentarius Commission and the Foreign Currency Research Program.

Reporting on Foreign Operations

BCF obtains information needed to determine how foreign fishing activities and developments affect the U.S. fishing industry and U.S. Government programs and policies. Fishery attachés in Denmark, Ivory Coast, Japan, and Mexico supplied the United States Government and the commercial fishing industry with news on fishery developments in their regions. Current information on the world's ever-changing fisheries provided a basis for many U.S. Government and industry decisions. Such reports are also used in international negotiations and in resolution of international fishery problems.

BCF continues to provide current reporting on the increasing foreign fishing off United States coasts, particularly by Japanese and U.S.S.R. fleets. In 1968, East German and Polish vessels intensified their fishing in the Northwest Atlantic. In the Northeast Pacific, South Korea has entered the fishery formerly exploited primarily by Japan and the U.S.S.R.

Treaty Enforcement and Foreign Fisheries Surveillance

BCF, in cooperation with the U.S. Coast Guard, conducts enforcement and surveillance operations in Alaska, the Pacific Northwest, California, Puerto Rico, New England, and the mid-Atlantic area. Enforcement in California and Puerto Rico is primarily on the yellowfin tuna regulations recommended by the Inter-American Tropical Tuna Commission and adopted by the United States. The presence of large numbers of foreign fishing vessels in the other areas necessitates constant vigilance to ensure that these fleets do not violate the U.S. contiguous fisheries zone and territorial waters and deplete the stocks of fish. The provisions of 11 international agreements pertaining to these areas also must be enforced.

The program aims to:

1. Ensure observance by foreign fishing vessels of the provisions of various international agreements as well as the contiguous fisheries zone and territorial waters.

2. Enforce domestic fisheries regulations adopted in conjunction with international treaties (Pacific halibut, eastern Pacific yellowfin tuna, International Convention for the Northwest Atlantic Fisheries, and the Fraser River pink and sockeye salmon).

3. Gather information on activities of foreign fishing fleets off the United States so that such data will be available when needed for negotiations with foreign fishing nations.

BCF and the Coast Guard cooperatively patrol yearly about 330,000 air-miles and 120,000 sea surface-miles, primarily in the North Pacific and North Atlantic. Each year BCF Management agents make over 1,500 dockside inspections to enforce domestic regulations that have been adopted in conjunction with international treaties for Pacific halibut, eastern yellowfin tuna, northwest Atlantic groundfish, and Fraser River pink and sockeye salmon.

ACCOMPLISHMENTS AND OPERATIONS

Principal Accomplishments

BCF's more important accomplishments in 1968 are summarized below according to geographic areas. These areas are North Pacific; California; Hawaii; South Central States; Gulf of Mexico; Atlantic; and Great Lakes. Activities that are general rather than regional are discussed under the heading "General."

North Pacific

Accomplishments in the North Pacific region were numerous: sponsorship of a workshop on use of acoustical methods in fisheries, award of a contract to build a fish protein concentrate demonstration plant, Columbia River Fishery Development Program, design and inspection of fish protection devices, improving the distribution of fishery products, king crab population study, new technique for using refrigerated brine, new uses for selected fish species, Pribilof Islands Aleut Community and fur seals, protein recovery from processing plant effluents, salmon studies, shrimp-sorting trawl, and water resource developments.

Acoustical workshop.—Discussed at the BCF-sponsored Acoustical Workshop November 25 to 27, 1968, at Seattle, Wash., were various topics concerned with devices, such as echosounders. These topics included basic acoustical principles, acoustical properties of targets, equipment and techniques now used in acoustical surveys, and the future direction to be taken. The 104 registrants included 48 from the Seattle area, 36 from other Pacific coast areas including Alaska,

Canada, Oregon, and California, and one from Hawaii. Other registrants were 12 from the east coast, two from Michigan, three from the Gulf coast, one from England, and one from Norway. Participants toured BCF's Exploratory Fishing and Gear Research Base at Seattle and boarded the vessel *John N. Cobb* for a dockside demonstration of an acoustical counting apparatus. Participants were also able to visit The Honeywell, Inc., vessel *Neper* and the Canadian research vessel *Vector*.

Award of a contract to build an FPC (fish protein concentrate) demonstration plant.—In accord with Public Law 89–701, BCF awarded a contract in 1967 to build an FPC plant in the Pacific Northwest. This installation will demonstrate the commercial feasibility of FPC and provide operating and cost data for future private plants. The BCF plant will provide high-quality material to be used in developing food products.

In 1968, Congress enacted legislation to provide additional funds for the FPC demonstration plant. Earlier legislation (Public Law 89–701) authorized $1 million for constructing a demonstration plant. When proposals to construct the plant were sought, BCF found that additional funds were needed for the changed requirements. Construction costs (including provisions for unforeseen costs) were estimated at $1,900,000. After hearings on a request for increased construction funds, Congress passed Public Law 90–549 in October 1968, which amended the original law so that funds authorized for other purposes of the act could be used also for construction, in addition to the $1 million already appropriated (see app. B). Funds for operation are to be separately appropriated.

In October 1968, BCF signed a contract for the design, construction, and operation of an FPC demonstration plant to be built at Port of Grays Harbor, Aberdeen, Wash. The contract covers design, construction, and 1 year of operation. The total cost is $2,446,921. Of this amount, $1,585,000 is for design and construction and $862,000 is for 1 year of operation.

BCF expects the plant to begin operating in spring or summer of 1970.

Columbia River Fishery Development Program.—The Columbia River Fishery Development Program continued its activities to manage and preserve the salmon and steelhead runs of the Columbia River Basin. It funded the operation of 21 hatcheries, 723 fish screens, and 83 major fishways. Much of the work is carried out through contracts with the Bureau of Sport Fisheries and Wildlife and conservation agencies of Idaho, Oregon, and Washington.

BCF, through the Columbia River Fishery Development Program, cooperates with Idaho, Oregon, and Washington and the Bureau of Sport Fisheries and Wildlife in a comprehensive and systematic fishery management program for the entire Columbia River Basin.

Two major study programs, Appraisal of Project Results and Management Techniques, complement the coordinated Federal-State effort to operate hatcheries and fishways and maintain fish screens. The appraisal study evaluates the results of hatcheries, screens, fish ladders, and various stream improvement practices. The management study includes development of new ways to improve resource management including hatchery production. Part of the appraisal and management studies are contracted to State conservation organizations and universities.

In 1968, Columbia River salmon runs from natural spawning were somewhat smaller than those in previous years; apparently, the effects of flooding in 1964 are still being felt. Runs of hatchery fish, however, were very good; coho salmon runs were outstanding. Over 40,000 coho returned to Washougal Hatchery even though a special coho fishing season was permitted.

Results of the Columbia River coho hatchery evaluation study involving 21 hatcheries indicate that these salmon are widely distributed in the ocean from British Columbia to California. Greatest concentrations are off Washington and Oregon. Half of the coho salmon taken in the Oregon coastal fishery originated in these hatcheries.

The contribution of hatchery fish to stocks of fall chinook salmon also has been very encouraging. Recent studies indicate that hatcheries contributed about 287,000 chinook salmon of the 1961 brood. This contribution represents about 10 percent of the total Pacific coast chinook salmon catch.

Because of improved hatchery techniques, returns of steelhead trout at the Columbia River Program Hatchery at Skamania, Wash., have increased from 1,000 in 1960 to 15,000 in 1967.

Artificial propagation of spring chinook salmon on Willamette River is now producing exceptional returns to that watershed. Raising hatchery fish to a larger size before releasing them accounts for most of the success of this program.

In the first year of operation, the completed portion of Willamette Falls fishway passed 13,523 spring chinook salmon, 16,193 coho salmon, 3,572 fall chinook salmon, and 2,275 steelhead trout.

Considerable success also was achieved by rearing salmon in artificial impoundments. Almost two million migrant-size chinook salmon were released from the 20-acre Wahkeena impoundment, and 18,000 young chinook were released from the 6-acre Ringold impoundment. The

cost of rearing chinook salmon in artificial impoundments was less than the cost of raising salmon by regular hatchery techniques.

An investigation sponsored by Columbia River Fishery Development Program has discovered a selective fish toxin that will kill predator squawfish and not harm salmon, steelhead trout, and other desirable species.

Design and inspection of fish protection devices.—In Portland, Oreg., BCF has a small staff of hydraulic engineers and fishery biologists who plan, design, and inspect barriers, fishways, locks, screens, spawning channels, and other devices needed in water development projects throughout the Nation, as well as in the Columbia River Basin. This fish facilities staff helped design or acted as advisers on projects in Alaska, California, Idaho, New England, Oregon, and Washington. In 1968, both public and private agencies accelerated their demand for services of this staff.

Certain fish-passage difficulties in the Columbia River Basin were eventually corrected, largely as a result of the advice of the fish facilities staff.

A principal task in the Basin in 1968 was to collect and pass anadromous fish at the projects on the mainstream Columbia River, in the Snake River, and Willamette River. Unfavorable conditions for fish passage developed at John Day Dam before, during, and immediately after the filling of the pool. Significant losses of salmon occurred until the fish facilities staff provided help.

A major accomplishment of the staff was development and installation of a TV fish-counting facility at Willamette Falls. This system, used with video tape, will substantially reduce the costs of counting fish. The U.S. Army Corps of Engineers is considering the installation of this system at each Corps major dam on Columbia and Snake Rivers.

Improving the distribution of fishery products.—The pilot program begun by BCF in May 1967 to improve the Midwest distribution of fresh and frozen North Pacific fishery products has been successful. BCF work with air freight carriers, distributors, fish processors, and retailers has helped expand the markets for fish from the Seattle area. Air shipments from Seattle in 1966 were under 300,000 pounds; in 1967, they were 1.9 million pounds; and in 1968 they rose to 3.9 million pounds. Increasing amounts of fish were also shipped by air from other West Coast ports, such as Astoria, Oreg., and San Francisco, Calif.

This program has benefited the fishing industry in several ways. It sponsored exhibits in which introductory samples were given to the public, introduced products in new marketing areas, and provided an effective theme for advertising the products on radio and TV and

in printed media. Air distribution offers an excellent opportunity to develop stable markets for underutilized fishery products. Major consuming areas can be regularly supplied with large volumes of abundant moderately priced items, such as groundfish.

King crab population.—Studies made by BCF Biological Laboratory at Auke Bay, Alaska, of the king crab population in eastern Bering Sea show a continuing decline in the average length of commercial male crabs from 152 mm. in 1965 to 146 mm. in 1968. The evidence supported a further reduction in quotas allotted to the Japanese and U.S.S.R. king crab fisheries.

New technique for using refrigerated brine.—Scientists at BCF Technological Laboratory at Seattle, Wash., have modified a technique used for years by the tuna industry to freeze tuna aboard vessels in refrigerated brine. The successfully tested modification involves refrigerating fish in a brine solution containing dissolved carbon dioxide.

The new technique has many advantages. It is a significant improvement because CO_2 inhibits bacterial growth. Holding salmon in a CO_2 brine, for example, extends shelf life 10 to 18 days. If fully developed, the technique will increase efficiency aboard vessels by eliminating the use of ice aboard many vessels, improving the quality of the fish, reducing labor costs, and decreasing physical damage to the fish. Processing plants can also use the technique to hold such fish as salmon, sardines, and shrimp.

New uses for selected fish species.—In 1968, BCF Technological Laboratory at Seattle, Wash., sought new uses for Pacific rockfish, spiny dogfish, starry flounder, and Pacific hake. When the economical heat-and-eat product, now being developed by BCF, is adopted commercially, greater use will probably be made of Pacific rockfish. Minced rockfish is being mixed with corn starch, milk, monosodium glutamate, onions, and salt. This basic recipe can be used in preparations, such as fish cakes, chowders, loaves, and sausages.

BCF is experimenting with several species of rockfish for use in the Japanese-style minced fish product called "surimi." Surimi, a frozen fish product used for making fish cakes and fish sausage (including kamaboko) in Japan, may provide a market outlet for some of the United States groundfish species. BCF is collaborating with the Japanese in a research project to evaluate the use of some United States fish in these products. Surimi is frozen, minced, washed fish flesh used in Japan as a raw material for subsequent processing where elastic gel-type characteristics are needed. The degree of elasticity that develops depends on the species. Certain species have myofibrillar protein with a great deal more elasticity than other species. This intrinsic

property of elasticity varies with storage conditions. Some species, for instance, retain it after long periods of frozen storage, whereas other species lose it within a few hours after being brought aboard a vessel.

Several preliminary investigations indicate that certain rockfish may be quite suitable for surimi.

BCF is also evaluating spiny dogfish and starry flounder for potential use in surimi.

Because of its soft-textured flesh, Pacific hake has been used in recent years principally for fish meal. Present studies of the laboratory in Seattle may lead to use of Pacific hake for human food in the form of sausages or frankfurters because blending may be necessary to firm the soft-textured flesh.

Pribilof Islands Aleut Community and fur seals.—Activities in the Pribilof Islands in 1968 concerned the Aleut Community, management of the fur seal industry, and methods of harvesting fur seals.

Until recent years, the Federal Government owned and operated the village of St. Paul and made all decisions on such matters as finances, public health, and safety. In 1950, the community was organized as the Aleut Community of St. Paul Island, Alaska. Since its organization the Community has assumed greater responsibility for self-government through operation of the grocery store and canteen, regulation of alcoholic beverages, construction and leasing of a post office to the Post Office Department, operation of a gas station and a repair shop, formation of a volunteer fire department, and contracts with the State of Alaska for police protection on a cost-sharing basis. The Community operated the Company House (hotel) in 1967; however, operation reverted to BCF in 1968.

The U.S. Public Health Service in 1968 continued to supply health and hospital services.

The State of Alaska continues to administer the elementary schools on the Islands. An agreement between BCF and the State of Alaska provides for reimbursement from the Pribilof Islands fund under a formula based on the number of pupils enrolled and the average cost per pupil in the State rural school system.

Major construction on St. Paul involved four "prefabricated" houses, a metal warehouse, and a sewage treatment plant. The houses and warehouse were completed, but a great deal of work remains to be done on the sewage disposal system. Except for a central prepackaged unit consisting of the bathroom, utility room, and kitchen, the houses were primarily precut rather than prefabricated.

Managing the fur seal industry was another important activity in 1968. Northern fur seals were harvested on St. Paul and St. George Islands during June 26 to August 16, 1968. St. Paul Island yielded

46,576 commercial sealskins from 36,252 males, 3,278 immature females, and 7,046 mature females. St. George Island yielded 11,956 commercial sealskins from 9,185 males, 964 immature females, and 1,807 mature females. On both Islands 428 skins were rejected as unsuitable for processing.

The female fur seals were killed because BCF scientists believed that the islands had 13,000 too many females for the optimum breeding size of the seal population.

Methods of harvesting fur seals also received much attention in 1968. Since 1965, humane societies and societies for protection of animals have observed the methods of killing harp seals and hooded seals in the Gulf of St. Lawrence. These societies have been extremely critical of the sealers. Their criticisms of the killing practices of the Canadian and Norwegian sealers have also drawn attention to the operations on the Pribilof Islands. Although the species and methods used in the Gulf of St. Lawrence and Alaska are different, news media confused and intermingled them.

During 1968, the Department of the Interior and the Humane Society of the United States agreed on a task force to review the fur seal harvest on the Pribilof Islands and to experiment with various methods of killing. During their study the task force observed the seals being driven and killed, measured the length of drives, recorded the time that elapsed in killing operations, and tested other methods for killing seals. The task force made several recommendations on methods to improve the harvest. BCF is following the recommendations. The task force concluded that the present method of clubbing the seals to death was preferable to the other methods of killing that were tried. None of the other methods could be adopted at this time.

Protein recovery from processing plant effluents.—BCF Technological Laboratory at Seattle, Wash., may have solved the problem of water pollution caused by effluents from fish-processing plants. Laboratory experiments in 1968 demonstrated that waste proteins can be recovered from dilute solutions as protein-phosphate complexes. Such recovery of the protein nitrogen is simple and inexpensive. Comparative feeding tests (protein efficiency ratio) indicated that the nutritive value of the complexed protein was about equal to the values of the noncomplexed protein.

Salmon studies.—Studies made by biologists of the BCF Biological Laboratory at Auke Bay, Alaska, on the early sea life of sockeye salmon in Bristol Bay prove that the young fish migrate seaward in a narrow band along the north shore of the Alaska Peninsula. Survival of juveniles is high when there is an early breakup of pack ice in Bristol Bay and eastern Bering Sea and poor when pack ice remains

fast well into the spring. This information may lead to improvement of the annual Bristol Bay forecast of sockeye salmon runs—one of the major aims of salmon research in Alaska because better forecasts are important to the domestic fishing industry.

The salmon that spawn in Alaska streams and are caught on the high seas provided U.S. fishermen with a catch that averaged 48.6 million fish between 1956 and 1966; they had a value to the fishermen of $37 million annually (1965 prices). Scientists at the BCF Biological Laboratory in Seattle have hypothesized that these salmon can be located in the open sea by observing prevailing North Pacific current systems in the area. In 1967, for the first time, they were able to direct experimental search for salmon by using oceanographic observations. The hypothesis holds that maturing sockeye salmon—the ones that will be caught during the coming season—are associated with the Alaska Stream that flows to the west just south of the Aleutians. The immature fish, which will enter the catch in coming seasons, are found more to the south, in waters that flow to the east. Data supporting this hypothesis were obtained on a joint research cruise of one BCF and two Japanese vessels.

Scientists from the BCF Biological Laboratory in Seattle, Wash., perform research on Columbia River salmon. These studies are centered primarily on how water-use projects affect salmon and steelhead trout. The aim is to develop methods for reducing losses and improving production of these fish. The program is closely coordinated with other BCF programs, the Bureau of Sport Fisheries and Wildlife, the five fishery agencies of the adjacent States, Corps of Engineers, private and public power companies, Battelle-Northwest, and local universities. The fishery technicians and administrators of the Columbia Basin Fishery Technical Committee receive complete reviews of progress made by BCF.

Turbines and predation are causing large losses of fingerling salmonids on the Columbia River. At present maximum power outputs, losses in turbines may be as high as 19 percent of the fish passing through them; losses to predators in certain slack-water areas may be as high as 33 percent.

The BCF proposed gatewell-sluice system is the most advanced method of bypassing juvenile fish around dams and will receive increased emphasis in future research; other methods are needed for diverting most of the fingerlings from the intakes into the gatewells. A horizontal traveling screen, proposed for use in intakes, has proved successful, and the percentage of young fish diverted to gatewells may also be increased by gross roughening of intake ceilings to produce special flow effects in the boundary layer.

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The collection of fingerlings at upriver dams for transport by truck around several subsequent dams is another means for protecting fish. Marked test groups of juvenile salmon were transported around dams and other barriers to a site release downstream at John Day Dam. Their survival was more than twice that of fish released above Ice Harbor Dam. In three separate studies, groups of juveniles released below dams reached the Columbia estuary in significantly larger numbers than groups that were released above the dams. Transportation of juvenile salmon around an area polluted by a pulp mill doubled the number of fish that were able to reach the estuary.

Research with sonic tags has identified two factors that contribute to the loss of adult salmon in the Columbia and Snake Rivers: spillway operations at dams such as McNary and differences in temperature and gas contents of the Snake and Columbia Rivers at their juncture. Adult salmon suffer physical damage during periods of high spillway discharges by being swept back downstream through the spillway or by entering the extremely turbulent areas below the spill where they are thrown against structures of the dam. Fish also die because spillways entrain large quantities of air and cause the river to become supersaturated with nitrogen. Under such conditions, fish may contract gas bubble disease. Each year high temperatures occur in the Snake River before they do in the Columbia River. Studies in 1967 showed that this temperature difference (up to 10° F.) blocked the Snake River runs at the mouth of the Snake for 9 weeks. There was also evidence that fish died. BCF biologists suspect gas bubble disease because the Columbia River was supersaturated with nitrogen. Fish accommodated to the supersaturated waters of the Columbia would be extremely susceptible to gas bubble disease if only brief periods were spent in the higher temperatures of Snake River.

Shrimp-sorting trawl.—BCF Exploratory Fishing and Gear Research Base at Seattle, Wash., has designed a new shrimp-sorting wing trawl. This gear appears to be a promising way to separate shrimp from small fish and debris during fishing and to return the fish unharmed to the sea. During tests in the fall of 1968, the trawl caught as much as 2,000 pounds of shrimp per ton. The catches usually had less than 1 percent trash, whereas conventional shrimp nets that were used nearby had catches with as high as 80 percent trash. The trawl has significantly reduced the time-consuming work of sorting and also permits fishing in areas where the catches of trash are high. There is, however, one problem with the trawl, and the base's fishery scientists continue to seek a solution: catch rates of the shrimp-sorting trawl are lower than those of conventional trawls.

Water resource developments.—BCF and the Bureau of Sport Fish-

eries and Wildlife jointly prepared a special study report that analyzed the impact of various combinations of developments on fish and wildlife resources of the middle Snake River, Idaho. The report was forwarded to the Bureau of Reclamation. This report helped to influence the Federal Power Commission to delay the hearings on the authorization of the construction of High Mountain Sheep Dam. During the delay, the Department of the Interior was able to develop an alternate position.

The staff of the Portland Program Office reviewed and gave opinions on the 461 water development projects. The staff also participated in three major comprehensive studies: the Willamette Basin Comprehensive Review, the Puget Sound and Adjacent Water Study, and the Columbia North Pacific Study.

BCF preliminary studies and joint planning with the Bureau of Reclamation for developing the Umatilla River indicate that annual benefits to the fishery would be $4.4 million if fishery development were included as a major purpose of the project.

The development of the Alaska oil industry and its effect on fishery resources have been concerns of BCF. The rapid growth of the petroleum industry in Upper Cook Inlet, Alaska, and more recently the important oil discovery on the North Slope (Arctic Ocean) have required considerable effort by the BCF River Basin studies staff in Alaska. Oil exploration and development work elsewhere in Alaska are progressing at an unprecedented rate. In addition, the petroleum industry now is planning extensive exploration work on the Outer Continental Shelf in Beaufort and Bering Seas (including Bristol Bay) and Gulf of Alaska. The petroleum industry is studying the feasibility of installing a pipeline from the Arctic Ocean across Alaska to a deep-water port on the Gulf of Alaska. This 800-mile, 48-inch pipeline, costing about $1 billion, would traverse lands and waters that have valuable fish and wildlife. BCF is cooperating with other agencies in developing plans to assess how such a pipeline would affect the fish and wildlife resources of this great region. These studies are urgently needed because little is known about such effects. The BCF River Basin studies staff participated also in the Oil Pollution Control Task Force established for Alaska. The staff has played a key role in forming a contingency plan for Alaska, the "Action Plan for the Oil Pollution Task Force," and has participated in developing a research program for oil pollution control.

The BCF staff also provided considerable data and information to the Federal Water Pollution Control Administration for its national estuarine pollution study and participated in developing a type I framework study outline and budget for the Water Resources Council.

California

In California, the chief accomplishments involved EASTROPAC, a fast-sinking tuna purse seine, military food service training, tuna fishery forecasting, and XBT (expendable bathythermograph) program.

EASTROPAC.—BCF is the coordinating agency for the international cooperative oceanographic investigation of the eastern tropical Pacific Ocean (EASTROPAC), which completed a 15-month period of field work in April 1968. BCF's principal aims in EASTROPAC are to estimate the size of oceanic tuna stocks, particularly to the westward of present fishing grounds; to increase our knowledge of the oceanography of the eastern tropical Pacific; and to gather background information that may be used in the forecasting of tuna abundance and distribution. Oceanographic data and biological collections resulting from the field cruises were processed, and progress was made on the EASTROPAC Atlas.

Fast-sinking tuna purse seine.—Scientists at the BCF Fishery-Oceanography Center in La Jolla, Calif., and a gear expert of the BCF Exploratory Fishing and Gear Research Base at Seattle, Wash., have designed a fast-sinking tuna purse seine with a fishing depth that is 70 percent greater than the usual net. This seine was designed because studies had indicated the U.S. tuna fleet could save money in terms of vessel operating time if the number of successful sets could be increased. Based upon model studies, a prototype net was constructed. A commercial tuna fishing vessel tested the net off the California coast. The vessel set the new seine 19 times and caught fish in 17 of the sets—an 89-percent success and half again as much as could be expected with a conventional seine at that time and in that area.

The BCF base at Seattle will made additional tests and try this net on other fish.

Military food service training.—Personnel in BCF Division of Marketing are presenting seafood educational programs to food service personnel at military training installations in California. BCF has emphasized these programs because the armed services represent an important market for fish and shellfish. This market can be increased by training the military to make greater use of fishery products in their menus.

To coincide with the training schedule established for the classes attended by military food service personnel, BCF gives 1-day training sessions every 4 weeks. A typical day at a BCF session consists of having groups of students prepare several fish recipes, giving a lecture on fish cookery, demonstrating the prepared recipes, and holding a tasting session. These programs are particularly beneficial because

many students go on to supervise the feeding of thousands of troops, become instructors to other commissarymen throughout the Service, and often continue in food service activities when they leave the military.

BCF marketing personnel also provide the military with information not readily available elsewhere.

Tuna fishery forecasting.—The BCF tuna-forecasting service, which is primarily for the albacore tuna fleet off the West Coast, continued to provide temperature charts and advisory radio broadcasts so the fleet could better follow the fish, increase its catches, and reduce the searching time. The tuna industry in general, sport fishermen, U.S. Navy, and State and local officials have widely acclaimed the BCF fishery forecasting service.

XBT (expendable bathythermograph) program.—BCF Ocean Research Laboratory, Stanford, Calif., directs the "ship-of-opportunity" program using XBT's to obtain temperature data for upper layers of the ocean. This program continued to progress. A triangle run was established between San Francisco, Honolulu, and Nikiski (in Cook Inlet, Alaska). In agreement with the Chevron Shipping Co., the laboratory installed equipment on the *Arizona Standard* to record periodically the water temperatures to a depth of about 400 fathoms between Honolulu and Alaska. Usually about 30 XBT's are dropped each trip. The *Californian*, a Matson Line freighter, continued to make runs with the XBT system about once a month between San Francisco and Honolulu. Although relatively minor technical problems need to be resolved, the XBT program has been a great success. Eventually other waters may have similar programs.

Hawaii

In the Hawaii area, the chief accomplishments involved the demonstration of eddies and their relation to tuna, genetic studies of skipjack tuna, and publication of "Oceanographic Atlas of the Pacific Ocean."

Eddy phenomena and tuna.—Although skipjack tuna are known to inhabit a wide range of ocean, in Hawaiian waters they are caught as a rule no more than 60 miles from islands; in the eastern Pacific they are caught somewhat farther offshore. If skipjack tuna are to be located and harvested from vast areas of the open ocean, we must greatly improve our knowledge of the mechanisms that concentrate them. A BCF oceanographer in Honolulu has found that eddies that form in the lee of islands bring cool, enriched water to the surface layer and are, therefore, more productive than adjacent waters and, consequently, provide more forage for fishes, including tunas. The eddies tend to maintain their identity as they move downstream from

the island where they were formed. This phenomenon may help explain the dispersion of near-shore animals far to sea and tuna concentrations hundreds of miles from the nearest land. Further study of island wakes may allow BCF scientists to pinpoint areas in the open ocean where concentrations of commercially harvestable fishes may be found.

Genetics of tuna.—One of the principal achievements of the BCF Biological Laboratory in Honolulu was the demonstration that skipjack tuna of the western Pacific (the basis of the largest tuna fishery of Japan) differ genetically from those of the eastern and central Pacific. The dividing line between the two appears to lie near Marcus Island at about long. 155° E. This discovery was based on chemical analyses of the fishes' blood systems. Such information on subpopulation structure is essential to rational management of tuna resources.

"*Oceanographic Atlas of the Pacific Ocean.*"—The Atlas, published in Honolulu in 1968, will aid all oceanographers and may be useful to any scientist who is interested in the Pacific Ocean. The Atlas summarizes results of observations made throughout the Pacific for over 50 years. Information is based on over 50,000 oceanographic stations, many of which have never before been used in an oceanwide study. Stations represent about 3 million separate observations of temperature, salinity, dissolved oxygen, and depth of sampling. The Atlas concerns primarily the uppermost mile of water, a region of great importance to oceanographers. Sources of data include institutes and fishery stations in Australia, Canada, France, French Oceania, Great Britain, Japan, and the United States of America.

South Central States

The chief accomplishments in the South Central States had to do with catfish: Warm-water fish farming in the United States has achieved new status and recognition with an explosive increase in channel catfish farming. Catfish now are under cultivation in 14 States, principally in the lower Mississippi River valley. Total acreage of catfish farms has expanded 25-fold since 1962. In 1968, acreage increased at its fastest rate, jumping from 15,000 acres in 1967 to about 25,000 last year, a two-thirds increase. At the same time, 27.5 million pounds of farm-raised catfish were produced in 1968 compared to 16.5 million pounds in 1967 and about 1 million pounds in 1962. Until 1968, farm-raised catfish were sold mostly to local live fish markets, such as areas where one can fish for a fee. But 1968 marked the advent of increased mechanized operations in harvesting and processing, together with an increasing number of businessmen attracted to the industry by the potential profits. Increased production has called

attention to the need for developing new markets for processed, farm-raised catfish that will be available in greater quantities in the future. Both large and small processors are studying, as potential markets, the entire restaurant market as well as retail food chains within and outside the southern region of the United States. In 1968, several drive-in restaurants in the South began serving the product. Vertical integration of activities from harvesting to marketing as well as cooperative arrangements among fish farmers characterized the growth of the industry in 1968. As of December 31, 1968, six processing plants for farm-raised catfish were operating, and prospects for increased production capacity are promising. In 1969, production of farm-raised catfish may exceed that of wild catfish in the United States.

In October 1968, an association, the "Catfish Farmers of America," was formed and brought together many entrepreneurs in the industry for the purpose of coordinating and promoting the growth of the industry. The group has held several meetings including a 1968 national convention in which BCF participated extensively. A great deal of enthusiasm and hopes for further progress have been generated.

BCF in 1968 has aided the catfish farmer in the areas of farm pond harvesting, processing, economics, marketing, and statistics, concentrating in areas of harvesting techniques, gear improvement, product quality, cost-efficiency, and marketing research. Of special interest are the developments in marketing and harvesting.

Development of markets for catfish. — The BCF Division of Marketing is assisting the catfish-rearing industry to develop stable markets for its rapidly increasing production. The BCF marketing office at Little Rock, Ark., provides liaison and assistance for this industry. Nationally, BCF encourages use of catfish by having demonstration workshops and providing newsletters, press releases, and publications.

BCF marketing personnel helped industry locate and supply all types of markets for producers, processors, and distributors of farm-raised catfish products. As a result of this activity, markets expanded in many directions. These markets include chain and independent restaurants, local and corporate food chains, and poultry distributors. Most recently the number of markets holding and selling live catfish in tanks or vats has increased sharply in the South.

BCF received approval from EDA (Economic Development Administration) for a contract study of the demand for processed catfish in volume-feeding outlets. BCF has under way with EDA a second study to obtain information on market outlets for live catfish.

Harvesting pond-reared catfish. — BCF technical assistance to the

catfish industry was mainly in the Arkansas-Mississippi Delta area. Several firms were given specifications of the harvesting equipment that BCF developed for pond catfish. Several times BCF personnel showed catfish farmers how to use the equipment. They devised also a method for safely harvesting catfish during the hot summer when prolonged crowding in small areas causes low oxygen levels and resultant deaths of the fish. The improved method uses a system to circulate water through the fish bag during seining and permits safe harvesting when water temperature exceeds 90° F. and oxygen levels are low.

Gulf of Mexico

In the Gulf of Mexico the chief accomplishments were marketing of shrimp and Spanish mackerel, prevention of rancidity in Spanish mackerel, shrimp biology, snapper fillet treatment, studies of nitrofurans, thread herring fishery, and studies of water resource developments.

Marketing of shrimp and Spanish mackerel.—The BCF Division of Marketing, the industry, and the States of Florida and Texas helped to move a large volume of shrimp whose total exvessel value was the highest in history. Movement of Gulf shrimp to market became sluggish in November 1968, but a concentrated shrimp marketing effort during the Christmas holidays helped firm the prices in late December 1968. This coordinated Federal-industry-State effort centered on publicizing a shrimp Christmas tree recipe. Publicity was gained through newspapers, TV, and retail chain stores throughout the Southern States.

Cooperative BCF marketing programs with States were made possible through the Commercial Fisheries Research and Development Act of 1964 (Public Law 88–309). These programs have also been instrumental in nearly doubling the volume of Spanish mackerel marketed in the past 4 years.

Prevention of rancidity in Spanish mackerel.—The BCF Technological Laboratory at Pascagoula, Miss., tried to find a way to prevent the development of rancidity in oily fish during frozen storage. Rancidity is a problem to the U.S. fishing industry because it results in shorter shelf life of the fish. Antioxidants have been used successfully to retard rancidity in foods of nonmarine origin, but they have been only partially successful in fish products. With Spanish mackerel, however, the antioxidant Na_2 EDTA effectively prevented rancidity as measured by taste tests and chemical tests reflecting low peroxide and free fatty acid value.

Shrimp biology.—The BCF Biological Laboratory at Galveston,

Tex., progressed with its shrimp studies. Eggs of the four common commercial shrimp species of the Gulf of Mexico have been hatched, and the young reared to postlarval stages in the laboratory. The eggs were obtained from females that were caught in the sea and brought alive to the laboratory where they spawned. In ponds fertilized to produce natural food, the shrimp have grown in 5 weeks to a size large enough to be used for bait or canned commercially. Survival was excellent, averaging 85 percent, and more than 250,000 postlarvae have been raised.

The laboratory also improved predictions of shrimp abundance. Its scientists developed an automatic sampler to sample postlarvae frequently as they enter estuarine nursery areas. Laboratory studies of bottom sediment preferences of postlarvae have enabled the laboratory to design a sampling scheme that should also improve the predictions of abundance.

Snapper fillet treatment.—The BCF Technological Laboratory at Pascagoula, Miss., solved a problem that had hampered the development of markets for the large unutilized stocks of snapper recently discovered in the Caribbean. Markets for the snappers had been limited because of rapid browning of the fillets, discoloration of the red skin pigment, and curling of the skin when cooked. The laboratory staff solved these problems by treating the fillets with a special chemical TDP (3, 3′-thiodipropionic acid) and then packaging them in cryovac bags.

Studies of nitrofurans.—Scientists of the BCF Technological Laboratory at Pascagoula, Miss., tried to find chemicals that will inhibit the action of proteolytic bacteria in seafood products. The bacteria lower the quality of seafoods by decomposing the flesh. The scientists found nitrofurans promising as inhibitory agents when applied to raw iced seafoods. The scientists also found that various small concentrations (1 and 3 parts per million) of nitrofurans prevent growth of the natural microbiological flora of shrimp.

Thread herring fishery.—In the winter of 1968, the BCF Exploratory Fishing and Gear Research Base at Pascagoula, Miss., and commercial fishermen continued their cooperative project to harvest thread herring and other sardinelike species off the west coast of Florida. This project began in the fall of 1967. Using knowledge acquired from experiments with remote sensing techniques, BCF scientists helped the fishermen locate schools of fish. The fishermen gave BCF scientists the catch data they needed for estimating the size of the schools. Landings of thread herring increased to 12 million pounds in 1968. This fishery marks the beginning of more intensive use of latent stocks of thread herring in the Gulf of Mexico. Such a fishery can supply the fish meal

industry during the season when the menhaden are not readily available.

Water resource developments.—BCF continued work on the Texas Coast Hurricane Study Project of the Corps of Engineers. Hydraulic model studies designed to test hurricane protection plans for Galveston Bay, Tex., indicated that to accommodate normal tidal exchanges the structures designed to prevent hurricane surge tides from entering the bay would have to be larger than originally planned. Additional testing will be required to determine if barrier designs are adequate to accomplish the necessary dispersion of pollution entering the estuary from the Houston ship channel.

The Florida Control Agency was helped by the results of estuarine studies carried out on the west coast of Florida and by the recommendations of the BCF scientific staff. This agency was instrumental in imposing a temporary moratorium on sale of submerged lands, establishing aquatic preserves, and developing a State policy to have bulkhead lines in estuaries set at mean high water when shown to be in public interest.

Biological data that BCF presented at a public hearing concerning a 138-acre dredge and fill project in a Florida estuary helped the city of Sarasota, Fla., to decide to deny a permit for the project. The Florida Control Agency upheld this action.

Excellent progress continued on the inventory of Gulf of Mexico estuaries, a joint effort of the five Gulf States and BCF. The cooperators essentially completed the area description for all estuarine areas on the west coast of Florida, most of the descriptive work for Mississippi and Alabama, and about half of the Texas coast. Using standardized sampling techniques, analytical procedures, and recording formats, the participants in this inventory also sampled 25 estuarine areas between Florida and Texas. Much of the information and data collected through this inventory has been given to the Federal Water Pollution Control Administration for its national estuarine pollution study.

Through the Gulf States Marine Fishery Commission, BCF helped the five Gulf States prepare two color films that stress the importance of estuaries for fish and wildlife resources and the relation of those resources to the economy of the Nation. When shown on TV, these films should greatly assist BCF to alert the public to the need for protecting these valuable and irreplaceable areas from unwise exploitation and pollution.

The first Corps of Engineers' permit to be denied solely on the basis of expected adverse effects to marine resources from dredging and filling encountered considerable trouble in the courts. In December

1968, the U.S. District Court in Tampa, Fla., handed down a decision that declared, in essence, that the Corps of Engineers has no authority to deny dredge and fill permits on the basis of fish and wildlife values.

Atlantic

The chief accomplishments of the Atlantic coast concerned containers for shipping fish, experiment with underwater habitat, fish meal, fish protein concentrate, groundfish fisheries, herring studies, lobster tagging program, menhaden research, microwave energy for opening oysters, new uses for ocean quahogs, oyster studies, seafood seminars, shipboard processing system, study of vessels fishing for haddock, tuna investigations, and water resource developments.

Containers for shipping fish.—The BCF Technological Laboratory at Gloucester, Mass., is trying to develop an insulated box that can be used to ship fresh fishery products long distances. Some tests have been made and others are in progress to determine how various transporting facilities (aircraft, trains, and trucks) affect the efficiency of shipment and quality of product at the point of delivery. The efficient containers that have been built and tested have substantially reduced shipping costs over long distances.

Experiment with underwater habitat.—Diver-scientists underwent extensive training and other preparations were completed for the project TEKTITE I, to be conducted in February–April 1969 at St. John, Virgin Islands. In the experiment a diving team will stay under water for a longer time than has been attempted before. TEKTITE I is an interagency cooperative program involving the U.S. Navy, NASA (National Aeronautics and Space Administration), the General Electric Co., and the U.S. Department of the Interior. In this effort, four Department of the Interior diver-scientists (including three from BCF) will live and work for 60 consecutive days on the ocean floor at a depth of 50 feet. The principal aims of the project are to make extensive marine science studies on the ocean bottom and observe behavior of men living together in an alien environment. Results of such studies can be applied to both future undersea missions and space missions of extended duration.

Fish meal.—To aid the animal feeding industry, the BCF Technological Laboratory at College Park, Md., began a systematic study to determine the amino acid, proximates, and minor elements in a range of commercial fish meals. This information helps feed formulators blend components. Biological data were obtained on availability and body assimilation of amino acids in fish meal from numerous samples of commercial fish meal.

FPC (fish protein concentrate).—AID (U.S. Agency for International Development) issued a contract for about 1,000 tons of FPC, to be made by the two-stage VioBin process, at New Bedford, Mass. Production on the first stage began in October 1968. Installation of equipment for the second stage, however, was not completed in 1968. The second stage of the process is needed to ensure adequate removal of solvent residues and residual components.

BCF Technological Laboratory at College Park, Md., is doing research on FPC. The technologists are trying to improve the chemical process for making FPC from both lean and fatty fish and have made great progress in developing methods for recovery of solvents. Quantitative recovery of isopropyl alcohol used for processing FPC is an important factor in holding down costs.

The researchers made good progress also in developing techniques for steam stripping to reduce the isopropyl alcohol content of the FPC. This process also reduces the amine present in the product. Amine complexes are flavor and odor components; their reduction helps produce a more bland and acceptable concentrate.

Biological methods for producing FPC were also studied at the laboratory. Both natural and purified enzymes have been used to solubilize groundfish—key steps in producing FPC by the biological conversion method. The biological method proved to be more expensive than the chemical method of preparing FPC.

The BCF National Home Economics Research Center at College Park, Md., also participated in the research. The Center began a study to develop a series of institutional recipes for using FPC as a protein supplement. Many institutional diets need increasing protein, and FPC can fill this need at a low cost.

The food research staff of the BCF Technological Laboratory at College Park, Md., also engaged in food research. It developed a series of new food products containing FPC. These include beverages of the milkshake type, baby formulas, and pasta products including noodles, macaroni, and spaghetti. All contain as high as 9 percent FPC by weight. A flavor evaluation panel found these foods acceptable. FPC in the foods produced no detectable changes in flavor.

The food research staff also prepared cookies for distribution at two meetings concerned with world and domestic needs for protein: a meeting of the Economic and Social Council in New York, N.Y., and a meeting of a private group in Washington, D.C., concerned with malnutrition in the United States, attended by a number of U.S. Congressmen. The good acceptance of the cookies showed the ease with which foods can be inexpensively supplemented with this animal protein.

Groundfish fisheries.—The major groundfish species of the Northwest Atlantic are now being harvested at or beyond the level of maximum sustainable yield. On the basis of surveys of the abundance of juvenile haddock, the BCF Biological Laboratory at Woods Hole, Mass., predicted the present crisis in the haddock fishery 2 years in advance. Field studies showed that haddock had not spawned successfully since 1963. Stringent limitations on fishing are now required to restore the haddock stock and to maintain the abundance of other groundfish stocks at a satisfactory level for maximum product.

Preparations have been made for an international cooperative study of recruitment and its relation to stock size and fishing intensity. The BCF research vessel *Albatross IV* along with Canadian and U.S.S.R. vessels will participate in this program. During 1968, BCF performed basic preparatory work needed to tool up for this cooperative multiship survey. A plankton sampler was selected for making standard collections. Calibration experiments to compare the performance of trawls, plankton samplers, and the vessels themselves, were made by Soviet and U.S. vessels in the fall of 1967 and again with a U.S.S.R. vessel and a Canadian vessel in the fall of 1968. A sampling technique was developed and tested. The BCF laboratory and the U.S.S.R. laboratory at the Baltic port of Kaliningrad have standardized methods for sorting collections. International cooperation of this type increases possibilities that countries will be able to develop workable management procedures on common property resources.

Herring studies.—Herring fisheries in the Northwest Atlantic have expanded greatly in recent years. In 1967, they exceeded a billion pounds; figures for 1968 are not yet available. The expansion is due to a marked increase in Canadian purse seining in Newfoundland and New Brunswick and in trawling by U.S.S.R., Polish, West German, and East German fleets on Georges Bank and areas south of Cape Cod and Long Island, N.Y. In 1968, United States and Canadian seiners began fishing for herring in the Jeffrey's Ledge area, within the Gulf of Maine. European trawlers also operated there.

Research by the BCF Biological Laboratory at Boothbay Harbor, Maine, has indicated that the Georges Bank stock is independent of the herring within the Gulf of Maine that support the Maine sardine fishery. The laboratory is making further studies to determine how the expansion of the herring fisheries within the Gulf of Maine may affect the stocks of Maine sardines.

Lobster tagging program.—Personnel of the BCF Biological Laboratory at Boothbay Harbor, Maine, tagged and released almost 2,700 offshore lobsters to determine migrations, growth, mortality, population size, and fishing rates. The average depth of release of tagged

lobsters was 80 fathoms. By the end of 1968, 65 lobsters had been recovered; 29 percent of these had migrated fewer than 10 nautical-miles, 45 percent 10 to 50 miles, and 26 percent had exceeded 50 miles. From April to November recaptures were made in an average depth of 57 fathoms; recaptures after November were made at an average depth of 153 fathoms.

Menhaden research.—Scientists at BCF Biological Laboratory at Beaufort, N.C., carried out what they believe is the greatest fish-tagging program in the world. They tagged more than 844,000 menhaden in five areas of the Atlantic coast. The nearly 93,000 tags that have been recovered are helping the scientists learn about the migrations of menhaden.

Microwave energy for opening oysters.—Scientists at the BCF Technological Laboratory at Gloucester, Mass., conceived and bench-tested a procedure for simplifying the shucking of oysters. The procedure involves microwave heating that causes the shell to gape. The shucker does not have to pry open the shell, which often breaks when pried and then contaminates the meat with shell fragments. Another benefit of this procedure is that the oyster shucker can increase greatly the amount of oyster meats he produces. The method can be adapted both to a batch-type and a continuous-type commercial process without noticeably changing the taste and texture of the shellfish. Oysters processed by this method, therefore, can still be sold raw on the half-shell. Cost data indicate that compared with opening by hand the use of microwave energy results in a 33-percent saving. Industry has shown considerable interest.

New uses for ocean quahogs.—The BCF Technological Laboratory at Gloucester, Mass., has experimented with ocean quahogs and has found that the characteristic strong iodine flavor can be removed by several washings. Ocean quahogs are then excellent for products such as clam chowder or clam puffs. BCF and industry are working together to make various ocean quahog recipes available to consumers.

Oyster studies.—The BCF Biological Laboratory at Oxford, Md., followed the distribution, prevalence, and spread within Chesapeake Bay of *Minchinia nelsoni*, an important parasite of oysters. Laboratory studies have helped determine mechanisms for transmission of *Minchinia nelsoni.*

The laboratory at Oxford is also studying various methods of suspended culture of oysters in both natural and artificial ponds. Good survival and growth have been obtained on 1,400 strings of 1965-year-class oysters suspended in a natural pond.

The BCF Biological Laboratory at Milford, Conn., studied genetics and selective breeding of oysters. Scientists followed 42 families of

randomly cross-bred oysters through several generations. The laboratory used chemicals and radioactivity to induce mutations in oysters. The laboratory does this work to determine the possibility of producing hybrids with desirable characteristics.

Working closely with oyster companies in Long Island Sound, BCF laboratory scientist-divers have been able to eliminate some of the oyster losses that are caused by accumulation of silt on oyster beds when the oysters are inactive because of the cold water. They transplanted oysters in March and early April before the silt began to smother them. Laboratory studies show that oysters do not die from the direct effect of cold water, which was formerly thought to cause winter-kill.

Seafood seminars.—The University of Massachusetts and the BCF Division of Marketing jointly presented at Osterville and Waltham, Mass., the first two of a series of seafood seminars to show food service operators how to use seafood products more efficiently. The course, which qualified for undergraduate credit at the University of Massachusetts, was designed to meet the needs of people concerned with management, purchasing, and preparation of seafoods. The seminars relied heavily on instruction from BCF marketing personnel, fishing industry representatives, food service professionals, and university professors. Instructions included such topics as market outlook, merchandising, preparation methods, promotion of fishery menu items, purchasing, quality control, and storage. Typically, a seminar includes 10 weekly 2-hour sessions—a total course length of 20 hours. Films, fish cookery demonstrations, lectures, panel discussions, and slide presentations are used. BCF and the university have received a very favorable reaction to the seminars from the participating attendees, instructors, and local industry representatives. Each seminar was evaluated, and the course material revised to keep pace with current needs of food service personnel.

Shipboard processing system.—Personnel of the BCF Technological Laboratory at Gloucester, Mass., have demonstrated a prototype system for handling and processing fish aboard New England trawlers. This system, which could significantly improve processing efficiency, has three units: (1) a mechanized fish hopper that can eliminate the repetitious and fatiguing bending and stooping now necessary aboard trawlers; (2) a vacuum eviscerator that sucks out the guts and thus eliminates the hand ripping and gutting that opens the fish to contamination by bacteria; and (3) a mechanized washer and water spray unit that greatly reduces the normal spoilage of freshly caught fish. The three units have been tested successfully aboard a BCF research vessel.

Study of vessels fishing for haddock.—The BCF Division of Economic Research studied the economic efficiency of haddock vessels. The analysis revealed how closely size and horsepower are related to economic performance. The study suggests that more emphasis should be placed on using large vessels with large horsepower engines. Such greater powered vessels would be better able to compete with foreign countries than the relatively small U.S. craft now fishing for haddock.

Tuna investigations.—In 1968, the BCF Tropical Atlantic Biological Laboratory at Miami, Fla., performed research designed to increase the total U.S. catch of tunas from the tropical Atlantic Ocean and provide the scientific information required for managing the tuna fisheries for optimum sustained yield. The laboratory expects that requirements for this information will increase rapidly when the Atlantic Tuna Convention enters into force. Meteorological, oceanographic, biological, and fishery investigations carried out by the laboratory should result in techniques for predicting when and where tunas will be found, provide knowledge needed for managing Atlantic tuna resources, and increase the effectiveness of American vessels fishing in the tropical Atlantic. Studies on Atlantic tunas include collection of catch and effort and biological data from commercial fisheries. These data are obtained through the efforts of BCF and through cooperation with foreign fishery organizations.

Water resource developments.—The BCF North Atlantic Region reviewed and reported on 220 separate water resource development projects. Most of the projects were associated with estuary alteration, beach erosion control, and hurricane protection. The region was represented on seven technical and policy committees relative to fishery studies in Delaware, Maryland, Massachusetts, New York, and Virginia. Region personnel attended 50 meetings to help coordinate the planning for power plants and the conservation and development of commercial fishery resources. The region also helped the technical committee for fishery management of the Connecticut River Basin to review potential sites for facilities to pass anadromous fishes over dams.

Great Lakes

The chief accomplishments in the Great Lakes region were studies of the alewife die-off in Lake Michigan, catfish research, electrical trawl development for the Great Lakes, evaluation of fish stocks in Lake Erie, insecticides in fish from Great Lakes, reservoir program, sea lamprey control, and water resource developments.

Alewife die-off in Lake Michigan.—During the spring and summer of 1968, gear experts of the BCF Exploratory Fishing Base in Ann

Arbor, Mich., in cooperation with personnel of the Federal Water Pollution Control Administration, provided technical direction to the joint State-Federal Lake Michigan alewife die-off control investigation. To remove dead alewives, the gear experts used the surface skim nets developed by BCF in 1967. They also trained the commercial fishermen who helped in the cleanup operations. The fishermen were shown how to handle these nets.

The fall survey of the alewives in Lake Michigan by the BCF Biological Laboratory in Ann Arbor, Mich., has made it possible to prepare an index of abundance of adult alewives and to determine the success of each year hatch of alewives. Information collected in the fall of 1967 led to the prediction that the die-off in 1968 would be far below that of 1967. Data on success of the 1966 and 1967 year classes show moderate hatches and the unlikelihood of significant die-offs in 1969 and 1970.

A study nearing completion has documented drastic changes in the composition and abundance of important species of zooplankton in Lake Michigan. The large species of plankton organisms have decreased more than the small ones, and selective predation by alewives may have caused the change. An alteration in the composition of the species and abundance of zooplankton could change Lake Michigan's ability to support certain species of fish.

Laboratory studies show alewives may be important predators of larval fish. Although larval fish are seldom found or identified in stomachs of alewives taken in the lakes, larval smelt were eaten readily by alewives in laboratory aquariums.

Catfish research.—The BCF Technological Laboratory at Ann Arbor, Mich., made considerable progress in its catfish research. Its personnel worked with industry to develop new processing equipment for sorting, gutting, heading, and skinning catfish. In addition, the laboratory provided information on processing plant layouts and made recommendations on process flow plans, as well as engineering specifications on refrigeration requirements for freezing and storing catfish products.

Electrical trawl development for the Great Lakes.—A prototype electrified trawl system, developed under a contract supervised by personnel of the BCF Exploratory Fishing and Gear Research Base at Ann Arbor, Mich., made significant catches of alewives and chubs in Lake Michigan. Compared to the usual, unelectrified trawls, the trawls with the electrical fields had catches 32 percent higher for alewives and 76 percent higher for chubs. Electrical fishing systems hold considerable promise for increasing the efficiency of harvesting.

Fish stocks in Lake Erie.—Studies on Lake Erie by BCF Biological

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Laboratory at Ann Arbor, Mich., showed no major changes in fish stocks. Compared to the past 10 years spawning success for most species was poor. Sheepshead, gizzard shad, and possibly white bass were the only species with a good hatch. The steady increase in sheepshead, which were not being harvested, was of some concern. Biologists continued to tag walleyes in New York waters of Lake Erie to follow seasonal movements and growth. Fifty-three of 2,523 walleyes released with a neoprene dart tag had been recovered, most of them east of their point of release.

Insecticides in fish from Great Lakes.—Scientists at the BCF Biological Laboratory at Ann Arbor, Mich., continued to measure insecticide levels in fish from the Great Lakes. DDT and dieldrin were found in all Great Lakes fishes. Fishes from Lake Michigan contained two to five times more insecticide than those from the other Great Lakes. Insecticide levels calculated on a whole fish basis showed a marked difference from species to species. As individual species increased in size, their levels of DDT and dieldrin also increased.

Other studies showed that fish with a high content of oil had a higher level of DDT than fish with a low content of oil. The portion of fish that had the oil had most of the DDT. Cooking such fish caused more than a 50-percent decrease in oil and insecticide. Fish fillets with low contents of oil lost very little insecticide during cooking; however, most of the insecticide in these fish was in the viscera and, consequently, was removed when the fish were cleaned.

Reservoir program.—Fish population studies of the BCF Biological Laboratory at Ann Arbor, Mich., in Oahe Reservoir, S. Dak., have enabled BCF biologists to estimate with considerable reliability the size of the buffalofish population. The commercial fishery is now based upon only two major year classes, 1959 and 1962. Their annual contribution to the catch peaked in 1968 and will gradually decline in the next 5 years.

Two important facts have emerged from the life history studies: (1) growth of most species has decreased in Oahe Reservoir since 1964, and (2) there has been no appreciable recruitment of commercial species since 1962.

Sea lamprey control.—Scientists of the BCF Biological Laboratory at Ann Arbor, Mich., and the Department of Fisheries of Canada continued the sea lamprey control program on Lakes Superior, Michigan, and Huron. This program is administered by the Great Lakes Fishery Commission. To evaluate the effectiveness of sea lamprey control, 16 electrical barriers are maintained annually on Lake Superior streams to assess the size of the adult lamprey population. In 1968, the population was larger than that of the previous 2 years but

remained below the average of all years because chemical control had reduced the population below its earlier high abundance. The lamprey population in Lake Superior, as measured in 1968, is 86 percent below the 5-year average before control.

In Lake Michigan a resurgence in the populations of burbot, rainbow trout, and whitefish and the apparent satisfactory survival of planted coho salmon and lake trout indicate that lamprey predation has declined. Both Lakes Michigan and Superior, however, have had an increase in the percentage of lake trout with lamprey wounds. Sea lamprey control in Lake Huron has not progressed to a point where its effect can be measurable.

Water resource developments.—Major BCF effort in this inland region in 1968 was to coordinate the commercial fishery interests and potential fisheries with water resource planning and development.

BCF paid special attention to the review of applications for building nuclear power plants, which have large-scale effluents of warm water. Potential harm to the aquatic environment from increasing numbers of these plants is causing concern among ecologists. Early in 1968 BCF held an inhouse seminar to discuss how best to solve this problem. Participants at the seminar recommended that ecological studies be made of how these plants affect the aquatic environments and that provisions for cooling facilities be included in all plant designs.

How to assess the potential production of commercial fisheries in water development projects continues to be a major problem. Commercial fish stocks of inland lakes, reservoirs, and streams probably will continue to yield only a few fish per acre. The technology to provide greater industrial fish production has yet to be developed.

BCF continued to participate in seven comprehensive basin planning studies. These studies include Souris-Red-Rainy River Basin Comprehensive Study, Missouri Basin Comprehensive Study, Upper Mississippi River Basin Comprehensive Study, Great Lakes Basin Comprehensive Study, Appalachian Regional Comprehensive Study, Great Lakes-Illinois River Basin Project, and Great Lakes Water Level Study. All comprehensive basin planning studies need to consider commercial fishery needs, problems, and opportunities for development. Considerable coordination is required among commercial fishery interests with other Federal agencies, States, and universities.

General

Many BCF activities in 1968 were general rather than regional. These activities concerned cooperatives, economic evaluation of Fishing Vessel Construction Differential Subsidy Program, estuarine stud-

ies, fish protein concentrate research, fishery product publicity, fishery statistics, inspection and certification program, irradiation of fish, Market News Service reporting, State Aid Program, and transportation of fishery products.

Cooperatives.—BCF's Fishery Cooperative Section, on behalf of the Secretary of the Interior, continued to administer provisions of the Fishery Cooperative Marketing Act of 1934.

The section also provided technical information and advice to four groups: (1) community leaders and fishermen in Gloucester, Mass., who wished to organize and operate a bargaining cooperative; (2) shrimpers who wanted a cooperative at Key West, Fla.; (3) shrimp fishermen and dealers who wanted a cooperative near Charleston, S.C.; and (4) the Hilton Head Fishermen's Cooperative at Hilton Head, S.C., who wished to increase the outlets for its products.

Economic evaluation of Fishing Vessel Construction Differential Subsidy Program.—The BCF Division of Economic Research evaluated the effect of the 1964 Fishing Fleet Improvement Act. The study indicated that substantial changes should be made in the law to prevent overfishing and to obtain the highest economic benefits from Government subsidies.

Estuarine studies.—Basic estuarine studies by BCF continued to supply valuable information needed for evaluating the effect of proposed manmade changes in these important areas. Biological studies were instrumental in preventing dredging and filling of over 200 acres of submerged land that had about $1,400,000 worth of natural resources, including fisheries and recreation. Personnel from BCF estuarine programs were involved in meetings and committees to evaluate changes in several major water diversion programs.

BCF personnel used radioactive tracers to determine how trace elements like iron, manganese, and zinc are cycled in marine organisms and in bottom sediments. They also developed techniques to measure rate of exchange of elements between sediment and water. These studies are valuable to scientists who are concerned with how food chains of commercial marine species are affected by pesticides and radioactive materials. Respiration rates may be depressed in marine organisms exposed to radioactive materials. This information may enable BCF to have a better understanding of changes in growth and survival of estuarine species.

Studies of the capacity of fish to develop resistance to DDT showed that no significant resistance occurred through eight successive generations.

The BCF monitoring program continued to accumulate information on the pesticides in mollusks at about 160 stations in major estuaries

throughout the country. The program collected information on types of pesticides and their concentrations and seasonal variations. This cooperative program with the States is providing important information on when and where pesticides are likely to occur in commercially important species.

FPC (fish protein concentrate) research.—BCF studied commercial processes for FPC manufacture by methods other than solvent extraction. Using an aqueous process, the BCF Technological Laboratory at Seattle, Wash., carried out research on a potentially useful method for preparing a different form of FPC. The researchers separated protein fraction from whole fish from a water suspension and dried it. Oil recovery from FPC made from fatty fish is an important aspect of the economics of the FPC process, and the laboratory is developing techniques for purification. The BCF Technological Laboratory at College Park, Md., made FPC from menhaden, anchovy, and other species to obtain necessary samples and data for a petition to the Food and Drug Administration. This petition will seek to increase the number of species of fish that are approved for FPC.

Fishery product publicity.—To increase sales of fishery products, BCF issued marketing materials, scheduled radio and television broadcasts, demonstrated fish cookery techniques, developed recipes, and circulated films.

BCF established a central mail facility in Chicago, Ill., to distribute its press materials on availability of various domestic fishery products, nutrition, preparation methods, purchasing, and quality.

The BCF Division of Marketing released three publications. "Flavor of Maine," which featured Maine sardines, was done in cooperation with the Maine Sardine Council and accompanied a Bureau-monitored film of the same title which the State of Maine sponsored under Public Law 88–309. Another publication, "Time for Seafood," featured ideas for quick preparation of seafood by today's homemaker, thus relating fishery products to growing trends toward convenience, efficiency, and speed in preparing meals. "Common Sense Fish Cookery," printed in both English and Spanish, was designed to help low-income families use fishery products for low-cost meals.

During 1968, the Division of Marketing scheduled 420 public service radio and television broadcasts to advise the public of good buys and provide facts on the fishing industry, ideas for serving fish, and news about the variety and availability of fish.

About 200 fish cookery demonstrations and presentations for college, institutional, military, restaurant, retail, and school lunch audiences were given before about 10,000 people. In this activity, marketing per-

sonnel featured availability, merchandising, nutrition, preparation, and quality maintenance.

BCF home economists made 452 recipe tests and 743 yield tests. These tests were made with consumer, institutional, and school lunch programs in mind. Recipes and related data were distributed nationally through cooperative Government agencies, demonstrations, and news media.

Three new BCF-produced motion pictures were introduced through industry sponsorship. "Flavor of Maine," "Mullet Country," and "Trout USA" are in national distribution through 200 film libraries. About 5 million people annually view films on 24 different fishery subjects.

Fishery statistics.—BCF's fishery statisticians assembled data on the fisheries for the 46 States that had commercial fishing. These data include the numbers of commercial fishermen, fishing craft, and gear, as well as the quantity and value of the catch by species and gear, production of processed fishery commodities, and foreign trade in fishery products. With the cooperation of State fishery agencies, the data on landings were published monthly for 18 States. Also printed monthly was information on the production of fish meal, oil, and solubles; freezing; and cold storage holdings of fish and shellfish. Released quarterly were data on the monthly production of fish sticks, fish portions, and breaded shrimp.

Inspection and certification program.—BCF provided continuous inspection and certification services to 40 processing plants on a cost-reimbursable basis. Fifty-seven inspectors inspected 265 million pounds (edible weight) of fishery products—22 percent of the annual domestic production. In addition, 13 lot inspection stations provided inspection services to 22 States and various State and Federal agencies that use USDI inspection when they buy fishery products.

To better provide the fishing industry with inspection services at an economical cost, BCF cross-licensed 55 inspectors from other Federal inspection agencies to sample and inspect products for quality and condition.

Irradiation of fish.—Use of gamma radiation in shorebased irradiation experiments on fish products at the BCF Technological Laboratories at Gloucester, Mass., Pascagoula, Miss., and Seattle, Wash., has shown that over 99 percent of bacteria responsible for spoilage can be killed without adversely affecting the quality of fish flesh. Results show that irradiated fishery products have a greater storage life than nonirradiated products and can, therefore, be transported over greater distances. To reduce spoilage bacteria to a very low level immediately after catching the fish, the Atomic Energy Commission furnished

portable 17-ton shipboard irradiators for use aboard BCF vessels. Fresh New England haddock that have been irradiated on shipboard have been held in ice to 33 days without loss of quality. This storage life compares with the normal average of 17 days for iced, non-irradiated haddock. Shipboard irradiation of haddock would also permit a vessel to remain longer at sea, if necessary, to obtain a full load. Shipboard irradiation studies have also been carried out aboard BCF vessels in the Gulf of Mexico by the BCF Technological Laboratory at Pascagoula, Miss., and in northeast Pacific waters by the BCF Technological Laboratory at Seattle, Wash.

Market News Service reporting.—The BCF Fishery Market News Service continued to provide the U.S. fishing industry with timely and current market information on prices, landings, market receipts, production of processed products, imports and exports, storage stocks, rail and truck movements, and trends and developments in foreign fisheries. Market News Service disseminated this information through its mimeographed daily "Fishery Products Reports" and other periodic or intermittent reports published by its seven field offices at principal fish landing ports and leading wholesale market centers. The Market News Service also made this information available to the fishing industry through other media including newspapers, periodicals, radio, telephone, and personal contacts. While Congress was in session the Market News Service also kept the fishing industry informed on legislative actions affecting fisheries and related industries.

State Aid Program.—Three acts authorize the BCF State Aid Program. These acts are the Commercial Fisheries Research and Development Act of 1964 (Public Law 88–309), the Anadromous Fish Act of 1965 (Public Law 89–304), and the Jellyfish Act of 1956 (Public Law 89–720). At the end of calendar year 1968, under these authorizations, the grant-in-aid program had received $23 million, of which $19 million was Federal moneys. Total appropriations under the acts in 1968 were about $6.8 million.

The 90th Congress extended for an additional 4 years the Commercial Fisheries Research and Development Act of 1964, beginning July 1, 1969, under Public Law 90–551. All 50 States, the Commonwealth of Puerto Rico, and the governments of the Virgin Islands, Guam, and American Samoa are participating in the program and carrying out cost-sharing projects concerned with research, development, conservation, and management of the Nation's commercial fishery resources. Cost-sharing projects are funded at either a 50- or a 75-percent level of Federal participation, whereas projects to alleviate resource disaster and to establish new commercial fisheries may be financed with 100 percent Federal funds. State matching funds

must be new moneys not previously used for other commercial fishery research and development.

At the end of calendar year 1968, 228 projects had been approved. The estimated total cost of these projects is $20.3 million, of which the Federal share is $15.5 million.

Projects that the States carry on with the first act, the Commercial Fisheries Research and Development Act of 1964, concern not only research and development of fish and shellfish resources but also construction of laboratories and research vessels. Examples of work being accomplished under this act include studies on development of high-energy feeds for a rapidly expanding channel catfish industry; research on the Alaska scallop that stimulated a new scallop industry; planting of oyster shells and brood oysters to restore commercial fisheries that had failed because of disasters in Mobile Bay, Ala., and San Antonio Bay, Tex.; and construction of research vessels by Montana and Texas.

The second act, the Anadromous Fish Act of 1965, authorizes the Secretary of the Interior to enter into cooperative agreements with States and other non-Federal interests for conservation, development, and enhancement of the anadromous fishery resources of the Nation and fish in the Great Lakes that ascend streams to spawn. BCF and the Bureau of Sport Fisheries and Wildlife administer this program jointly at the Federal level. Federal funds up to 50 percent may be used to finance project costs. State fishery agencies, colleges, universities, private companies, and other non-Federal interests in the 31 States bordering the ocean and the Great Lakes may participate.

Although the act became law in 1965, the first program funds were not made available until October 1967. At the end of calendar year 1968, 69 projects had been funded for 24 States and five other non-Federal interests. Total funding was $7 million, of which BCF's share was 50 percent.

Project emphasis is on the construction and expansion of Pacific salmon hatcheries, together with research on problems of nutrition and fish disease. Much attention is given also to better use of alewives, river herrings, and American shad; more accurate forecast of the timing and size of salmon runs; and stream clearance and other improvement of spawning habitat. Included are construction of Elk River Salmon Hatchery in Oregon, with a rearing potential of 2 million coho salmon annually for release in southern coastal streams; rehabilitation of 15 pink and chum salmon streams in Prince William Sound, Alaska, which were put out of production by the 1964 earthquake; removal of obstructions in Pacific coastal streams to provide access to 62 miles of salmon spawning and nursery areas; completion

of inventory of the barriers to the passage of alewives and American shad in New England coast streams; and construction of additional rearing ponds for increased hatchery efficiency and salmon survival at State-owned hatcheries in Oregon and Washington. In fiscal year 1968 (which began July 1, 1967), $2.15 million in program funds were made available to BCF under this act.

The Jellyfish Act of 1966, the third act, authorizes an appropriation of funds to be used by the States and other non-Federal interests to control and eliminate jellyfish and other such pests and to conduct research for controlling floating seaweed. The 22 coastal States and the Commonwealth of Puerto Rico are eligible for assistance on a cost-sharing basis. At the end of calendar year 1968, four projects with a total cost of $177,700 had been funded in Maryland, Mississippi, New York, and Virginia. Project activities are concerned primarily with the biology and control of jellyfish.

Transportation of fishery products.—BCF continued to help maintain adequate transport service and facilities for fishery products.

Reductions in nationwide passenger train service in 1968 forced REA (Railway Express Co.) to reduce much of its rail service and switch to trucks on many routes. Truck and air carriers will not accept the traditional REA methods of shipping fresh fish in wooden boxes with melting ice. Shippers, box manufacturers, BCF technologists, and a BCF transportation economist participated in several studies on designing and producing suitable insulated leakproof boxes that all carriers would accept. The National Bus Traffic Association, which represents all intercity and motorbus operators, began trial shipments of these new containers for fresh fish.

The airlines have widely accepted the new containers. Because of decreased REA operations and development of a leakproof box, air shipments of fresh fish in 1968 increased sharply.

The airlines at the end of 1968 had increased their general commodity rates for fishery products by as much as 120 percent. On behalf of the Secretary of the Interior, the Bureau's transportation economist intervened and stated that the rate increases would harm the fishing industry. The increased rates were suspended pending investigation by the Civil Aeronautics Board.

Fisheries Financial Assistance Programs

BCF continued to administer three financial assistance programs to aid the U.S. fishing industry. These programs are the Fisheries Loan Program, the Fishing Vessel Construction Differential Subsidy Program, and the Fishing Vessel Mortgage and Loan Insurance Program. A report of the activities under each program follows.

Fisheries Loan Program

The Fisheries Loan Program continued operations that began in the latter part of 1956. Public Law 89–85, enacted July 1, 1965, authorized continuation of this program; it extended the life of the Fisheries Loan Fund to June 30, 1970, and expanded the purposes for which loans may be made. Loans may be made for financing or refinancing the cost of purchasing, constructing, equipping, maintaining, repairing, or operating new or used commercial fishing vessels or gear under certain restrictions. The applicant must be a U.S. citizen, possess ability, experience, resources, and other qualifications necessary to operate successfully and show that reasonable financing is not otherwise available. During fiscal year 1968, 139 applications totaling $5,614,227 were received and 75 for $2,441,115 were approved. The total since the program began is 2,114 applications for $57,264,231, and of these 1,116 for $26,593,756 were approved.

Fishing Vessel Construction Differential Subsidy Program

Public Law 86–516 authorized the Fishing Vessel Construction Differential Subsidy Program that began in 1960, and Public Law 88–498, approved August 30, 1964, amended Public Law 86–516. During fiscal year 1968, $6 million were appropriated to carry out the purposes of the act. To qualify for a subsidy, a vessel must meet certain requirements. It must be of advanced design that will enable it to operate in expanded areas, be equipped with newly developed gear, and must not operate in a fishery if such operation would cause economic hardship to efficient vessel operators already operating in that fishery. A public hearing is required on each application before a finding of eligibility can be made. As of June 30, 1968, BCF received under the expanded program 93 applications for subsidies estimated at about $24,412,600. Of these, 50 were from New England, 16 from the Gulf coast area, 18 from California, seven from the State of Washington, and two from Alaska. Fifty-seven of these applications were approved after hearings, and by June 30, 1968, construction contracts were made for 26 vessels involving subsidies of $15,598,877.

Fishing Vessel Mortgage and Loan Insurance Program

This program provides Government insurance for mortgages given by lending agencies to construct, reconstruct, or recondition fishing vessels. During 1968, 51 applications for insurance totaling $4,094,918 were received and brought the total applications to 218 for $24,396,936. Forty-six applications involving $5,209,308 were approved during 1968, and 11 for $1,466,241 were pending as of June 30, 1968. Since this program began in 1960, the Department of the Interior has approved

179 applications for $20,261,379. Vessel owners and lending agencies continued interest in this program throughout 1968.

American Fisheries Advisory Committee

Key members of the U.S. commercial fishing industry constitute the American Fisheries Advisory Committee. The Secretary of the Interior, under provisions of the Saltonstall-Kennedy Act of July 1, 1954, appoints these members. The Committee provides the Secretary with advice and recommendations on matters relating to commercial fisheries programs in the Department of the Interior. The Committee met in 1968 in Kodiak, Alaska, July 21 to 31 and in New Orleans, La., December 9 to 11.

Appendix D lists the Committee members of 1968.

New Programs

BCF had two new research programs in 1968: the determination of consumer preferences for fishery products and the remote sensing of fishery resources.

Consumer Preferences for Fishery Products

BCF let a contract in 1968 to an established market research firm to determine consumer preferences for fishery products. Through use of diaries kept by homemakers the firm will provide data and information on this subject. BCF will analyze these data to determine basic principles of consumer demand for fishery products. Such knowledge will enable the fishing industry to market its products more effectively.

Remote Sensing of Fishery Resources

Application of remote sensing technology to fishery oceanography by the BCF Tropical Atlantic Biological Laboratory at Miami, Fla., is proceeding along two distinct but related courses. The first course emphasizes the fish; the second course emphasizes the environment in which the fish lives. The first course involves the direct detection of near-surface schools of fish through various photographic techniques and indirect detection of fish by finding fish oil slicks associated with submerged schools. The second course involves the detection of oceanic areas that are productive of fish—such detection is possible through identification and observations of ocean fronts, upwelling areas, and other oceanographic phenomena.

An approach to the direct detection of schooling fish that has great promise is the use of low-light sensors, such as image intensifiers, to detect bioluminescence, or fire, as fishermen refer to it. The fire results from movement of fish which causes certain organisms in the

water to glow momentarily. The bodies of rapidly swimming fish are outlined with light and, therefore, are easily identifiable through the image intensifier as the fish swim through the water.

Meetings

BCF officials participated in many international conferences and meetings chiefly to urge policies or gain knowledge that would benefit the U.S. fishing industry. Such participation includes presentation of scientific reports and preparation of background papers and position papers. International participation is becoming increasingly important as the developed nations of the world expand their fishing efforts to all ocean areas and as developing nations make more efforts to develop fisheries.

Subjects discussed at these meetings included construction materials for fishing vessels; FAO (Food and Agriculture Organization) matters, including FAO programs and budget, reorganization of FAO, cooperation of developed and developing FAO member countries, need for regional fishery bodies in the Southeast Atlantic and Southwest Atlantic, and review of present knowledge of the Indian Ocean fisheries; cooperation of the new Indian Ocean Fishery Commission and Indo-Pacific Fisheries Council, technical conferences on developments in research vessel design and harbors and port facilities; sea lamprey control, restocking of Lakes Superior and Michigan with hatchery-reared lake trout, introduction of coho salmon in Lakes Michigan and Superior; condition of stocks of tropical tunas and effect of the fishery on the tunas, yellowfin tuna quota; fish protein concentrate demonstration plant, comprehensive trawl regulations of the International Commission for the Northwest Atlantic; salmon, king crab, and groundfish resources in the North Pacific and Bering Sea; effects of foreign fishing upon halibut stocks in the Bering Sea and Gulf of Alaska; sockeye and pink salmon runs to the Fraser River system; seaweed products; whale catch in the Antarctic, North Pacific fur seal resources, and dietary inadequacy in the Western Hemisphere. A summary of the work done at these meetings follows.

Conference on Fishing Vessel Construction Materials

Canadian and other international experts (naval architects, boat builders, fishing vessel operators) presented 33 technical papers at the Conference on Fishing Vessel Construction Materials October 1 to 3, 1968, in Montreal, Canada. The Conference, sponsored by the Canadian Federal-Provincial Atlantic Fisheries Committee, was the fourth in a series organized to improve efficiency and economic conditions in the Canadian Atlantic coast fishing industry. The papers dealt

with vessel construction materials, including uses of concrete, fiberglass, laminated wood, plastics, plywood, resin and glues, steel, and wood. Materials of the future include modifications of all the current types of materials plus ferrocement and cellular plastics. The trend in construction for fishing vessels appears to favor steel for ships over 100 feet long. Aluminum, fiberglass-reinforced plastic materials, and wood are competitive materials for vessels 70 to 100 feet long. Aluminum, fiberglass-reinforced plastics, plywood, and wood compete with each other for vessels under 70 feet.

FAO (Food and Agriculture Organization of the United Nations)

In 1968, FAO advanced its work through its Committee on Fisheries, Council, Department of Fisheries, IOFC (Indian Ocean Fishery Commission), IPFC (Indo-Pacific Fisheries Council), and technical conferences.

Committee on Fisheries.—At the Third Session of the Committee on Fisheries in Rome, Italy, April 24 to 30, 1968, the representatives of developed and developing member nations had a beneficial exchange of views. Some of the major decisions made at the Third Session involved cooperation of developed and developing nations. One example was agreement to investigate the suggestion made by the 14th FAO Conference that multilateral funding agencies including UNDP (United Nations Development Program) be used to supplement FAO funding of regional fishery bodies.

The Committee on Fisheries approved in principle the reorganization of the Department of Fisheries to include three divisions.

In reviewing various regions of the world, the Committee realized that a regional fishery body is urgently needed in the Southeast Atlantic and felt plans should be made to convene a conference of plenipotentiaries to work on a draft convention. The Southwest Atlantic also needs a regional organization open to all nations that fish in the area.

FAO Council.—During 1968, fishery matters were of somewhat minor importance in the biennial regional conferences of FAO and at the 51st Session of the FAO Council, held in Rome, Italy, October 7 to 22. The FAO Council, however, endorsed actions affecting fisheries. To achieve better coordination, the Director-General proposed five areas of concentration that should receive emphasis in FAO programs and in the FAO budget. These areas are: work on high-yielding varieties of basic food crops, filling the protein gap, war on waste, mobilization of human resources for rural development, and earning and saving foreign exchange.

In agreeing with this new emphasis, the Council decided to replace the Technical Committee of the FAO Conference with only two new committees—one committee to deal with field programs and the other with the five areas of concentration. Because the Technical Committee on Fisheries has been abolished, the two new committees will now have the responsibility for reviewing the Director-General's Program of Work and Budget in Fisheries.

The Council also approved a reorganization of FAO that gives the Department of Fisheries a new Industries Division. The other two divisions in the Fisheries Department will be the Fisheries Resources Division and Fisheries Economics and Institutions Division.

FAO Department of Fisheries.—The FAO Department of Fisheries continued to expand as it began the second phase of growth approved by the 13th Session of the FAO Conference in 1965. The rate of growth, however, is less than was originally expected.

IOFC (Indian Ocean Fishery Commission).—At its 48th session in June 1967, the FAO Council established IOFC, which held its first session in Rome, Italy, September 16 to 20, 1968. Twenty-two of the 27 member nations, including the United States, sent representatives to the First Session, which reviewed present knowledge of the Indian Ocean fisheries.

IOFC, assisted by a Sessional Committee, studied and then considered the first phase of the International Indian Ocean Fishery Survey and Development Program. It proposed that the possibility of using UNDP funds to help finance the first phase be examined.

During the session, the Commission established an IOFC/IPFC Joint Working Party of Experts on Indian Ocean and Western Pacific Fishery Statistics in order to coordinate their activities with those of IPFC.

IPFC (Indo-Pacific Fisheries Council).—Relations of the IPFC with the new IOFC (Indian Ocean Fisheries Commission) were discussed at the 13th Session of IPFC in Brisbane, Australia, October 14 to 25, 1968. The Council agreed to establishing of the IOFC/IPFC Joint Working Party of Experts on Indian Ocean and Western Pacific Fishery Statistics.

IPFC recommended the formation of a South Sea Fishery Development and Coordinating Program, to be partially refunded through UNDP, that would provide a focal point for coordinating fishery development programs in the South China Sea area.

Representatives of 13 of the 18 member nations attended the session and the Symposium on Demersal Fisheries held during the session.

Technical Conferences.—FAO also convened technical conferences on subjects of worldwide fishery interest.

BCF and FAO sponsored the Second FAO Technical Conference on Fishery Research Craft in Seattle, Wash., March 18 to 24, 1968. The registration showed an attendance of 142 individuals, 45 of whom were from 17 countries outside the United States. Only 36 participants from 12 nations attended the first conference in Tokyo in September 1961. The 1968 Conference involved primarily an exchange of information and discussions on developments in research vessel design. Of especial interest was how the design was related to the activities of the research craft and how best to plan, equip, and use these craft.

BCF also participated in the FAO Conference on Fishing Ports and Port Markets in Bremen, Germany, September 23 to 28, 1968. One hundred and eighty representatives from 32 nations and four worldwide organizations attended the sessions. Emphasis during the Conference was on the development and operations of harbors and port facilities. Also emphasized were various aspects of marketing, including transport of fish, sales, financing, sanitation, storage, and market development.

Great Lakes Fishery Commission

At its 13th annual meeting, June 18 to 20, 1968, at Toronto, Canada, the Great Lakes Fishery Commission reported that the sea lamprey control program was continuing in Lakes Superior, Michigan, and Huron. State, Provincial, and Federal agencies have undertaken a massive restocking of Lakes Superior and Michigan with hatchery-reared lake trout. Growth and survival of planted lake trout have been encouraging, although natural spawning of trout in the lakes is still limited. Introduction of coho salmon in Lakes Michigan and Superior has also yielded favorable preliminary results.

At its interim meeting in Ann Arbor, Mich., December 2 to 3, 1968, the Commission noted that a special study is being undertaken to learn more about the effect of residual lamprey populations on trout spawning. Studies are also being made to determine the effect of pesticide residues in the Great Lakes on lake trout and coho salmon. These studies will provide valuable information to assist the Commission in coordinating fishery research and management programs in the Great Lakes.

IATTC (Inter-American Tropical Tuna Commission)

At its 20th annual meeting at Panama City, Panama, April 2 to 4, 1968, IATTC reviewed the research by its scientists whose aims are to obtain information on the condition of the stocks of tropical tunas and how the fishery affects the stocks. IATTC recommended to the member countries (Costa Rica, Ecuador, Mexico, Panama, and the United

States) that the yellowfin tuna quota for 1968 be set at 93,000 short tons. This quota was subsequently raised to 106,000 tons after further study by the IATTC staff showed the quota could be increased without exceeding the maximum sustainable yield.

IATTC again recommended that a portion of the yellowfin tuna quota be set aside to allow for an incidental catch of tuna after closure of the fishery. The season was closed June 18, and during the closed season the vessels of each country were permitted an incidental catch of yellowfin as long as the aggregate of the incidental catch of yellowfin tuna of the vessels of each country did not exceed 15 percent of the combined catch taken by such vessels, as recommended by the Commission. In 1968, the quota was exceeded by about 7,000 tons.

International Association of Fish Meal Manufacturers

The annual meeting of this association was held in Bremen, Germany, September 28 to October 5, 1968. A technologist of the BCF Technological Laboratory at College Park, Md., gave a brief report on the status of the fish protein concentrate demonstration plant. He also answered questions on research on fish meal and fish protein concentrate.

ICNAF (International Commission for the Northwest Atlantic Fisheries)

At its 18th annual meeting in London, June 4 to 8, 1968, ICNAF was notified by its executive secretary that comprehensive trawl regulations proposed by ICNAF would enter into force September 21, 1968. Placing these regulations into effect has been a significant accomplishment. There is growing evidence, however, that new regulatory approaches specifically designed to limit fishing intensity may be needed for fisheries in the ICNAF area. To facilitate development of such regulatory systems, the United States at the 1968 ICNAF meeting proposed amending the Protocol to the Convention to provide greater flexibility in types of fishery regulatory measures that may be proposed by ICNAF. This amendment, which would allow catch or effort quotas to be divided among member countries, is to be considered further at the 1969 annual meeting.

The Standing Committee on Research and Statistics and the Standing Committee on Regulatory Measures of ICNAF gave careful attention to the scientific and administrative aspects of developing limitations on overfished resources.

ICNAF also reviewed two pending Protocols that it had approved previously for ratification. One Protocol would simplify procedure for entry into force of regulatory proposals adopted by ICNAF. The

other Protocol would allow ICNAF to propose an international inspection scheme to ensure that its regulatory measures are being applied properly. In expectation of entry into force of this second amending Protocol, ICNAF reached general agreement on details of an international inspection scheme.

ICNAF also considered an offshore fishery for salmon that has developed off Greenland. Because unrestricted exploitation of salmon stocks on the high seas could interfere with conservation programs, ICNAF adopted a resolution recommending to member governments that they "consider urgently the desirability of preventing increases in high seas fishing for salmon by their nationals in the ICNAF area for the time being, and that high priority be given to studies of the effects of such high seas fishing on the resources."

INPFC (International North Pacific Fisheries Commission)

During the 2 weeks preceding the 15th annual meeting of INPFC at Seattle, Wash., November 4 to 8, 1968, scientists of Canada, Japan, and the United States reviewed results of the research the three countries have performed on salmon, king crab, and groundfish resources in the North Pacific and Bering Sea.

The Convention provides that when fishery resources are used by fishermen of two or more member countries, the Commission shall study the need for conservation measures. The Convention also provides that for certain resources under full utilization and under an effective program of research and management for conservation, member countries that have not previously participated in the fishery for such resources will refrain from doing so. Under this provision, Canada abstains from catching salmon in the eastern Bering Sea, and Japan abstains from fishing for salmon in the eastern North Pacific and Bering Sea east of long. 175° W. Japan also abstains from fishing for halibut and herring in certain areas. At the annual meeting, INPFC recommended no changes in this provision.

INPFC also recommended fishing regulations for the halibut fishery in the eastern Bering Sea similar to those in effect in 1968 and proposed closure to halibut fishing of an extensive area in the southeastern Bering Sea, which is a nursery ground for young halibut.

After reviewing results of research on king crab resources of the eastern Bering Sea, INPFC considered that existing regulatory measures for king crab, as a whole, are not adequate and agreed to forward its findings to the three Governments. INPFC also agreed to begin a study of the tanner crab resources of the eastern Bering Sea. In its consideration of research on groundfish other than halibut,

INPFC approved the selection of Pacific ocean perch as the first species to be studied.

International Pacific Halibut Commission

At its 44th annual meeting, January 23 to 25, 1968, at Seattle, Wash., this Commission approved a research program for 1968. The program continues the 1967 program of tagging and assessing possible effects of foreign fishing upon halibut stocks in the Bering Sea and Gulf of Alaska. The Commission also expressed concern about how increased trawling for other bottomfish affect the halibut stocks and drew attention of the two Governments (Canada and the United States) to how trawling affects the large population of small halibut in southeastern Bering Sea. This area has been set aside as a nursery area, and all fishing for halibut in this region has again been prohibited in the proposed regulations for 1968.

The Commission expressed particular concern for failure of stocks in area 2 (Convention waters south of Cape Spencer, Alaska) to respond to reductions made in removals from that area in recent years and noted that more restrictive measures will be necessary if the resource should fail to respond adequately in 1968.

International Pacific Salmon Fisheries Commission

At its annual meeting at Bellingham, Wash., December 11 to 12, 1968, this Commission reviewed predictions for the 1969 sockeye and pink salmon runs to the Fraser River system and proposed regulations for 1969.

The Commission discussed proposed construction of a pulp mill that could seriously harm the pink and sockeye salmon returning to one of the Fraser River systems. It discussed steps taken to call this matter to the attention of the proper authorities. The Commission also discussed development of the offshore troll fishery for sockeye and pink salmon and implications of this fishery to the management program of the Commission. The Commission is submitting to the two Governments (Canada and the United States) a report with updated statistics on this fishery which is outside Convention waters.

International Seaweed Symposium

The sixth International Seaweed Symposium at Santiago de Compostela, Spain, September 9 to 15, 1968, brought together commercial authorities, scientists doing original research, and Government officials who make the regulations of exporting and importing seaweed products. Over 250 delegates from 34 countries attended the Symposium. About 110 papers on a broad range of subjects associated with marine

algae and seaweeds were presented. A BCF representative presented a paper, titled "The Nutrient Content of Turtle Grass (*Thalassia testudinum*)." Two concurrent sessions were held. One session dealt with subjects, such as ecology and distribution, metabolism, physiology, and taxonomy. The other session dealt with subjects, such as chemical constituents of seaweed, manufacture of seaweed extracts, seaweeds in agriculture, and seaweeds in animal feedstuffs.

IWC (International Whaling Commission)

At its 20th meeting in Tokyo, Japan, June 24 to 28, 1968, IWC reported that eight expeditions (four Japanese, one Norwegian, and three Soviet) operated in the Antarctic in the 1967–68 season. They caught 2,155 fin whales and 10,357 sei whales, equivalent to 2,804 blue whale units, and 2,568 sperm whales. IWC's Scientific Committee reported its best estimate of the present sustainable yield of fin and sei whales for the whole Antarctic to be equivalent to 3,400 blue whale units. In accordance with policy adopted by IWC in 1966 that the total catch should be less than the combined sustainable yields of the fin and sei whale stocks, IWC set the pelagic catch limit for the 1968–69 Antarctic season at 3,200 blue whale units, the same as in the previous season.

Delegates from 15 contracting governments and observers from four countries and six international organizations attended the meeting.

IWC was notified that the North Pacific whaling countries (Canada, Japan, United States, and U.S.S.R.) had agreed to adopt measures to conserve whale stocks in the area and had decided to limit the catch of fin whales in the North Pacific in 1969 to 1,600 whales. They had also agreed to limit their sei whale catch in the North Pacific in 1969 so that it would not exceed the 1967 level.

North Pacific Fur Seal Commission

The North Pacific Fur Seal Commission held its 11th meeting in Moscow, U.S.S.R., April 8 to 12, 1968. The Standing Scientific Committee of the Commission met for 2 weeks preceding the Commission meeting to review its 1967 research and plans for 1968.

Under terms of the Convention, the Commission is required to make studies to determine whether pelagic sealing may be permitted in conjunction with land sealing without adversely affecting achievement of the Convention aim, i.e., to achieve maximum sustainable productivity of fur seal resources of the North Pacific Ocean. At end of the 11th year the Commission is required to recommend to the contracting parties (Canada, Japan, United States, and U.S.S.R.) whether pelagic

sealing should be permitted. The Standing Scientific Committee reported it had decided that insufficient scientific information had been obtained upon which to base a recommendation. The Commission, accordingly, recommended that further studies be made.

Western Hemisphere Nutrition Congress II

At the meeting of the Western Hemisphere Nutrition Congress II at San Juan, Puerto Rico, August 26 to 29, 1968, a technologist of the BCF Technological Laboratory at College Park, Md., gave a paper on the biological process for preparing fish protein concentrate. An interdisciplinary group of over 800 scientists attended the meeting. The scientists wish to encourage use of the knowledge of nutrition to solve problems of dietary inadequacy in countries in the Western Hemisphere.

Cooperation and Coordination with International, Federal, State, and Other Agencies

Through cooperation with various foreign governments, other Federal agencies, States, universities, and private organizations, BCF profits from the facilities and skills of these cooperators and the exchange of ideas and results. BCF also coordinates many of its programs with these groups.

Cooperation with International Groups

Cooperation enables international groups to solve mutual problems by developing and exchanging needed information. International organizations, such as Food and Agriculture Organization of the United Nations, Great Lakes Fishery Commission, International Commission for the Northwest Atlantic Fisheries, International North Pacific Fisheries Commission, and North Pacific Fur Seal Commission coordinate the research efforts of many countries including the United States.

In 1968, BCF participated in the work of Codex Alimentarius Commission and in the Foreign Currency Research Program.

Codex Alimentarius Commission.—BCF assists in the work of Codex Alimentarius Commission, an international body operating under auspices of the United Nations. The Commission is trying to develop and establish international standards for foods.

At the third session of the Codex Committee for Fish and Fishery Products at Bergen, Norway, October 7 to 11, 1968, the International Codex commodity standards were discussed for a number of fishery products. The standard for canned Pacific salmon was moved ahead

to step 8 of 10 of the Codex procedure. Once the final two steps are taken, the standard becomes final. Subsequently, the U.S. Food and Drug Administration will use it as a basis for a standard of identity in the United States. The standards for canned shrimp and prawns, frozen fillets of cod and haddock, and frozen Pacific salmon were moved ahead to step 6.

Opinion was divided on including performance requirements in Codex standards. Canada, Netherlands, Sweden, and the United Kingdom believe the standards should have process specifications or essential information on how to handle and preserve the product. Denmark, Japan, Norway, the United States, and other countries favor using a standard only to define the characteristic of the final product. A tentative compromise was evolved: process specifications would not be a standard but would be incorporated into a Code of Technological Practice.

Foreign Currency Research Program (Public Law 480).—As provided in section 104(b)(3) of Public Law 480, BCF undertakes fishery research projects in cooperation with institutions in foreign countries. Research was carried out on 11 projects in India, Israel, and Poland, and a number of scientific papers useful to BCF scientists were translated in excess foreign currency countries. BCF obligated $88,444 during 1968; $1,628,761 has been obligated since the fishery research program began in 1962.

Major accomplishments of research being carried out in India include examination of over 10,000 herringlike fishes collected from the Bay of Bengal and the Indian Ocean. Methods for identifying the numerous species are being worked out. These methods will enable scientists to follow trends of abundance of individual species.

Other Indian scientists found that the time of spawning of female catfish can be advanced 1 month by exposing them to artificial light. Application of this knowledge by fish culturists will permit greater use of hatchery facilities and increased production.

In another experiment they found that when one ovary of a catfish is removed, the remaining ovary attained the size and egg count of the original two ovaries within 22 days. If this technique can be applied to sturgeon, these scientists believe a 50-percent increase in caviar production could be realized.

Israeli researchers gave special attention to improving present fish farming practices. After discovery of the method to spawn mullet in captivity, emphasis was placed on techniques to rear young to a size suitable for stocking ponds. Geneticists continued extensive controlled experiments in tanks and ponds to produce faster growing and better quality carp.

There was also technological research. One project studied how low levels of fish products affect the utilization of plant protein by growing chickens and pigs. This project was carried out at the Institute of Animal Physiology and Nutrition, Poznan, Poland. Some work associated with this project included sampling of fish meal of known technological quality. The meal was supplied periodically during the year. This fish meal was chemically analyzed to determine composition and quality of the product. Bioassays were made by feeding meal to chickens and rats. Information was obtained also on seasonal variability of the quality of fish meal produced aboard vessels and reliability of different methods of assessing its nutritional value.

Pilot experiments on broilers and pigs were carried out, aimed at establishing the lowest levels of fish meal and fish solubles necessary for optimal growth when added to rations composed of different plant feeds. Results of the project can be used by the United States and foreign feed manufacturers as a guide for developing rations for broilers and pigs.

BCF operates one of the world's most comprehensive programs for translating foreign fishery and oceanography literature. This translation program benefits industry, the Federal Government, State agencies, and academic groups. During 1968, over 1,000 articles, books, and scientific papers (15,715 pp.) were translated, and about 13,000 copies of the translations distributed. Translations are being done primarily in Israel, but also in India, Poland, Tunisia, and Yugoslavia. Foreign currency under the Public Law 480 program finances the major part of the translation program.

Cooperation With Federal Agencies

BCF has formal and informal agreements with other Government agencies—Agency for International Development; Atomic Energy Commission; Department of Agriculture; Department of Commerce (including the Bureau of Census and the Weather Bureau); Department of Defense; Department of Health, Education, and Welfare; Department of Labor; Department of State; Department of the Treasury; Economic Development Administration; and Federal Trade Commission.

A few of the cooperative efforts are listed here. BCF provided the Agency for International Development technical information on fisheries. BCF also worked closely with the Department of Agriculture in scheduling and promoting U.S. foods at international food fairs. BCF participated also in the Economic Development Administration's programs on projects related to commercial fishing industries in

some of the economically depressed areas designated for redevelopment under the Public Works and Economic Development Act of 1965.

Cooperation with AID (Agency for International Development).—BCF provides AID with technical information that it can use to help develop marine resources overseas. The FPC (food protein concentrate) unit of BCF gives technical assistance to AID's Food From the Sea Service of the Office of the War on Hunger. The Food From the Sea Service has a contract for studying the feasibility of producing and marketing FPC in Chile and Korea. BCF helped to train field investigators for this contract and prepared guidelines for use of FPC in indigenous foods.

BCF also provided technical assistance under AID for the South Korean estuarine fisheries in cooperation with FWPCA (Federal Water Pollution Control Administration). Two BCF employees and an FWPCA employee took part in the project that should result in improving the quality of shellfish taken from Korean coastal waters.

BCF continued its project for developing the fresh-water fisheries of northeast Brazil with AID funds. BCF sent a new project leader to Brazil to replace the leader who had completed his tour of duty.

BCF also arranged training programs in fisheries-related subjects for 34 participants from 15 countries (Brazil 3, Republic of China 1, Colombia 1, Ghana 4, Guyana 2, Indonesia 4, Kenya 1, Korea 5, Nigeria (East) 1, Nigeria (West) 1, Pakistan 4, Sierra Leone 2, Thailand 3, Uganda 1, and Zambia 1). AID recommended and financed these participants.

Cooperation with USDA (Department of Agriculture).—BCF and USDA, Foreign Agricultural Service, International Trade Fairs Division, work closely together in promoting and scheduling U.S. fishery products at international food trade fairs. The success of the BCF international trade promotion program resulted from the excellent assistance of USDA, which has had 13 years' experience in organizing and operating food fairs.

BCF and USDA cooperate also in USDA's Plentiful Foods Program. When supplies of fishery products create marketing problems and prices decline, USDA, at the request of BCF, adds these products to its "List of Foods in Plentiful Supply." USDA then distributes the list nationally to buyers, food trade personnel, and news media. In 1968, BCF requested and received assistance from USDA's Plentiful Foods Committee to publicize availability of North Pacific halibut steaks. BCF personnel are members of the Committee.

Cooperation with EDA (Economic Development Administration).—During 1968, BCF continued to participate in EDA's program as provided for by the Public Works and Economic Development Act of

1965 (Public Law 89–136). At EDA's request, BCF personnel reviewed, evaluated, and commented on seven proposed projects related to commercial fishing activities in economically depressed areas in California, Hawaii, Massachusetts, Mississippi, New Jersey, Texas, and Washington and made recommendations for approving or denying the funding of the projects. BCF personnel also helped local committees develop proposals to improve economic conditions of depressed areas. The proposals included expansion of existing commercial fishery activities or development of new ones.

Funds provided by EDA during 1968 for projects related entirely or in part to commercial fishing were nearly $6 million. EDA approved technical assistance grants for $534,000 for developing the catfish farming industry; developing canning and marketing of underutilized fishery resources; building a shrimp peeling and deveining machine; studying the development potential of American Samoa; and determining employment potential of ocean-oriented industries in San Diego, Calif.

EDA also made public facilities grants in excess of $3 million to finance projects in Alaska and Texas. Commercial loans of more than $2 million were made for construction of port, harbor, and dock facilities, expansion of water systems, and expansion of a shrimp-processing plant.

Cooperation With States

BCF cooperates with two interstate commissions—Atlantic States Marine Fisheries Commission and the Gulf States Marine Fisheries Commission. These Commissions coordinate the conservation actions and research efforts of the States involved in interstate compacts. Formal agreements provide for this coordinated action.

All coastal and inland States with commercial fisheries have cooperative arrangements with BCF for collecting and compiling fishery statistics.

Cooperation With Other Groups

BCF cooperates closely with numerous national, regional, and local fishery and allied trade associations. This cooperation uses BCF's development, research, and service functions.

In 1968, the BCF marketing staff extended its marketing services to non-Federally supported marketing programs and major industry trade associations. The marketing staff solicited the plans of all organizations with active fishery marketing programs, compiled them into a summary, and distributed the summary nationally so that the information could be exchanged among the organizations.

BCF uses also the professional skill and research facilities of universities, State agencies, trade associations, and private organizations by contracting with such groups to supplement Government research and service activities. Appendix E lists the organizations with which BCF had research and development contracts and grants in 1968.

Organization, Employment, Budget, and Physical Properties

A summary of BCF organization, employment, budget, and physical properties in 1968 follows.

Organization

Over a period of nearly a century BCF and its predecessor agencies have added new organizational units as new functions were acquired. Recently, however, the problems of our varied commercial fisheries have become so complex and so critical that the traditional organization of BCF may have been a handicap in aiding the industry effectively. The conditions in each fishery vary greatly. Each has its own distinct problems and opportunities. The old organization structure focused attention on the various disciplines rather than the specific problems of the various fisheries. Such a structure hampered a thorough analysis of fishery problems and the most effective allocation of resources to work on those problems.

BCF has recently adopted an entirely different organizational concept that will make it possible to use a systems approach to Federal fisheries work. The new organization, approved November 21, 1968, is designed to solve a broad array of problems for specific fisheries, that is, resource problems, technological problems, legal problems, and socioeconomic problems.

The new organization structure groups people and programs into two major functional areas. The first of these combines the fishery research activities of BCF in a single problem-solving unit, which will permit BCF to concentrate its talents on the most critical fishery problems. The second major functional area brings together BCF's assistance to industry or service activities that tend to be of a continuing nature and relatively constant for a given level of program effort. In each case the major management units will have a clear responsibility for program accomplishments in their respective areas.

Figure 1 shows the old discipline-oriented organization of BCF; figure 2 shows the new organization of BCF approved as of November 21, 1968.

BUREAU OF COMMERCIAL FISHERIES

OLD ORGANIZATION

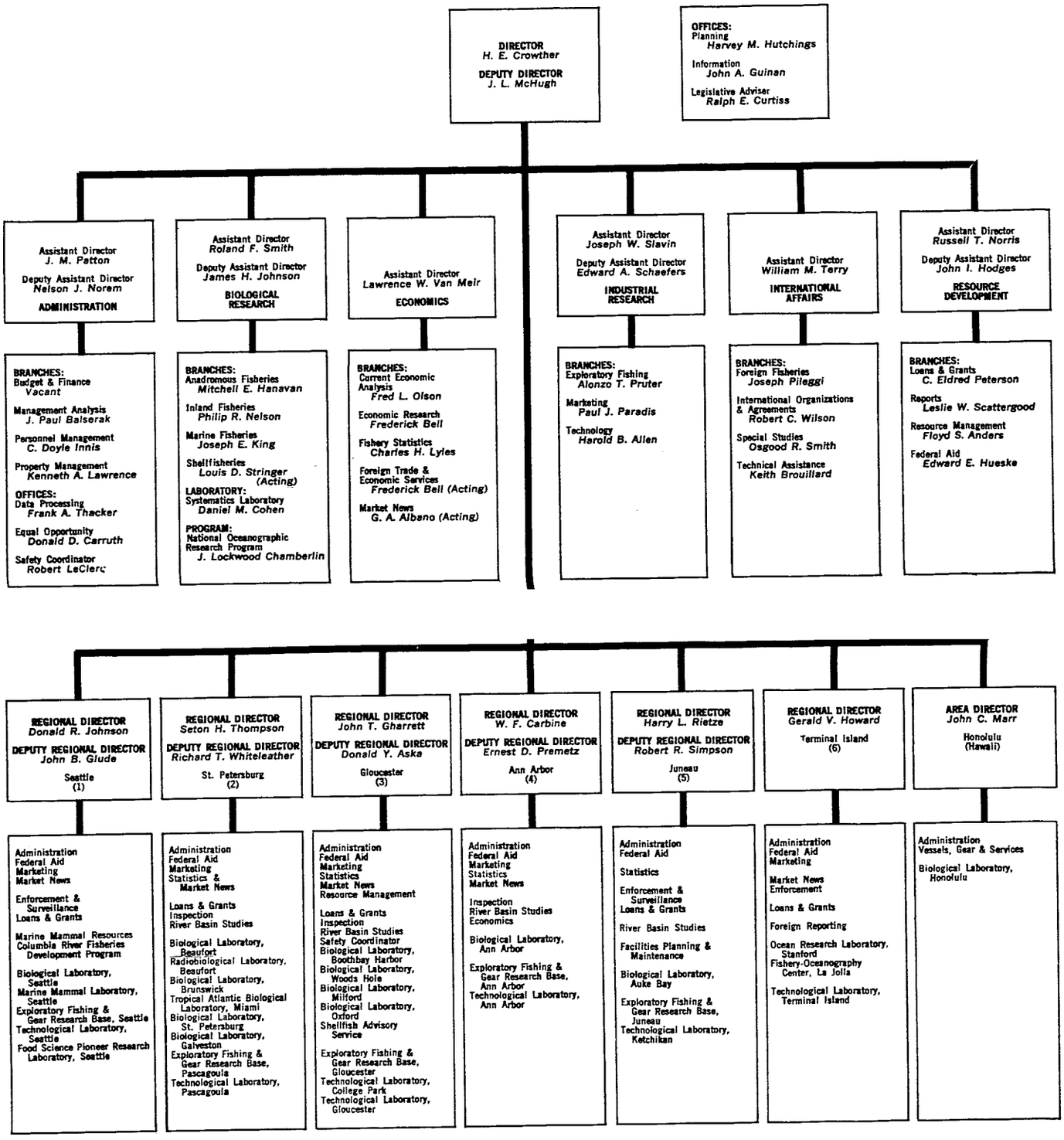
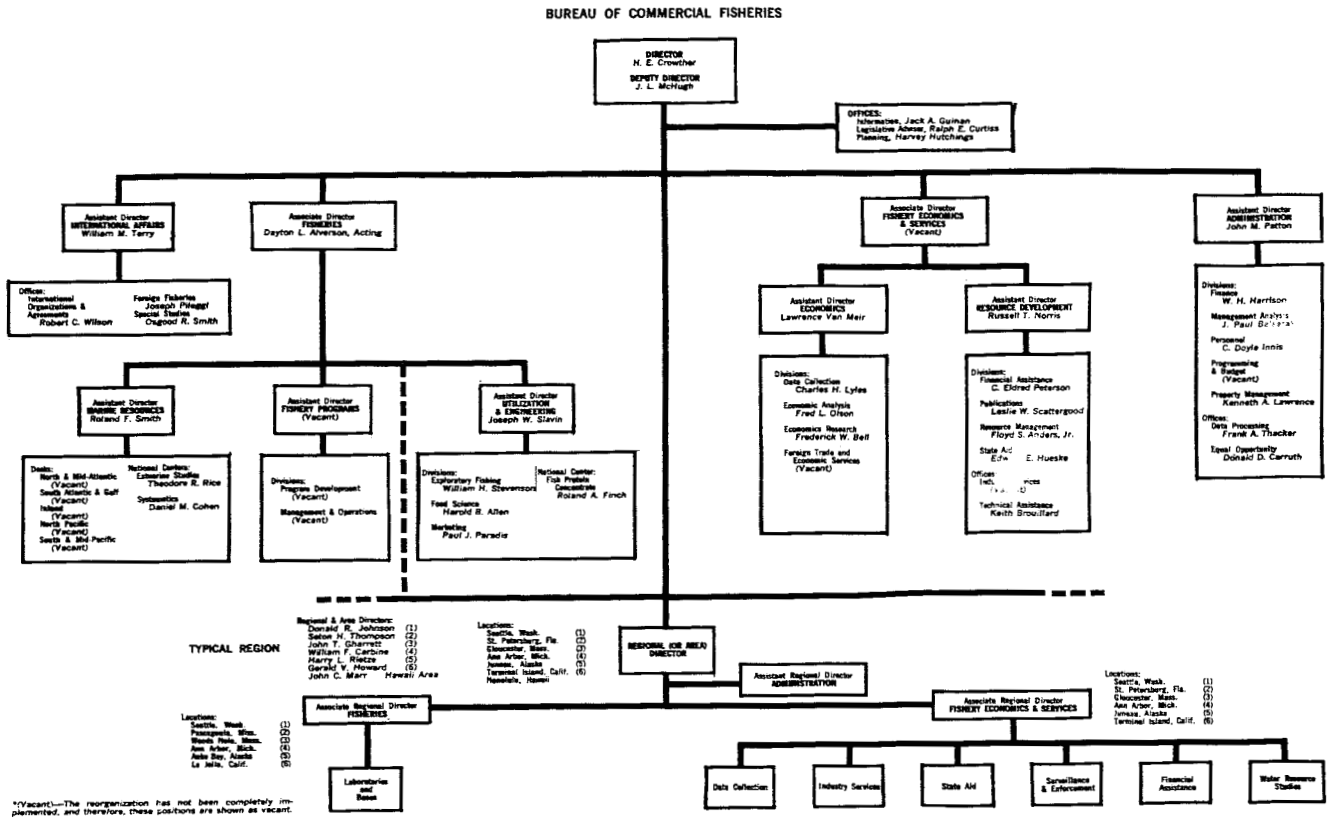


FIGURE 1.—Old organization chart, Bureau of Commercial Fisheries (up to November 21, 1968).



*Vacant—The reorganization has not been completely implemented, and therefore, these positions are shown as vacant.

FIGURE 2.—New organization chart, Bureau of Commercial Fisheries, approved November 21, 1968.

Table 1 shows the new field organization of BCF as of November 21, 1968.

TABLE 1.—*New field organization of BCF as of November 21, 1968* [1]

Region 1, Seattle, Wash.

Regional Office, Regional Director
- Administration, Assistant Regional Director
- Fisheries, Associate Regional Director
  - Biological Laboratory
  - Exploratory Fishing and Gear Research Base
  - Food Science Laboratory
  - Marketing Program
  - Technological Laboratory
- Fisheries Economics and Services, Associate Regional Director
  - Columbia River Fisheries Development Program, Portland, Oreg.
  - Data Collection office
  - Enforcement and Surveillance office
  - Financial Assistance office
  - Industry Services office
  - Marine Mammal Resource Program (Marine Mammal Laboratory)
  - State Aid office

Region 2, St. Petersburg, Fla.

Regional Office, Regional Director
- Administration, Assistant Regional Director
- Fisheries, Associate Regional Director, Pascagoula, Miss.
  - Tropical Atlantic Biological Laboratory, Miami, Fla.
  - Biological Laboratory, Beaufort, N.C.
  - Biological Laboratory, Galveston, Tex.
  - Biological Laboratory, St. Petersburg, Fla.
  - Exploratory Fishing and Gear Research Base, Pascagoula, Miss.
  - Exploratory Fishing and Gear Research Station, Brunswick, Ga.
  - Marketing Program
  - Technological Laboratory, Pascagoula, Miss.
- Fishery Economics and Services, Associate Regional Director, St. Petersburg, Fla.
  - Data Collection office, New Orleans, La.
  - Financial Assistance office
  - Industry Services office
  - State Aid office
  - Water Resources Studies office

Region 3, Gloucester, Mass.

Regional Office, Regional Director
- Administration, Assistant Regional Director
- Fisheries, Associate Regional Director, Woods Hole, Mass.
  - Biological Laboratory, Boothbay Harbor, Maine
  - Biological Laboratory, Milford, Conn.
  - Biological Laboratory, Oxford, Md.
  - Biological Laboratory, Woods Hole, Mass.
  - Exploratory Fishing and Gear Research Base
  - Marketing Program, Boston, Mass.
  - Technological Laboratory
- Fishery Economics and Services, Associate Regional Director
  - Data Collection office, Gloucester, Mass.
  - Data Collection office, Boston, Mass.
  - Enforcement and Surveillance office
  - Financial Assistance office
  - Industry Services office
  - Safety office, Boston, Mass.
  - Shellfish Advisory Service, Oxford, Md.
  - State Aid office
  - Water Resources Studies office

Region 4, Ann Arbor, Mich.

Regional Office, Regional Director
- Administration, Assistant Regional Director
- Fisheries, Associate Regional Director
  - Biological Laboratory, Ann Arbor, Mich.
  - Biological Field Station, Ashland, Wis.
  - Biological Field Station, Ludington, Mich.
  - Biological Field Station, Marquette, Mich.
  - Biological Field Station, Millersburg, Mich. (Hammond Bay)
  - Biological Field Station, Sandusky, Ohio
  - Exploratory Fishing and Gear Research Base
  - Marketing Program
  - Technological Laboratory
- Fishery Economics and Services
  - Data Collection office, Ann Arbor, Mich.
  - Data Collection office, Chicago, Ill.
  - Economics office
  - Industry Services office, Chicago, Ill.
  - State Aid office
  - Water Resources Studies office

See footnote at end of table.

TABLE 1.—*New field organization of BCF as of November 21, 1968* [1]—Continued

Region 5, Juneau, Alaska

Regional Office, Regional Director
- Administration, Assistant Regional Director
- Fisheries, Associate Regional Director, Auke Bay, Alaska
  - Biological Laboratory, Auke Bay, Alaska
  - Exploratory Fish and Gear Research Base
  - Facilities Planning and Maintenance
  - Technological Laboratory, Ketchikan, Alaska
- Fishery Economics and Services, Associate Regional Director
  - Data Collection office
  - Enforcement and Surveillance office
  - Financial Assistance office
  - State Aid office
  - Water Resources Studies office

Region 6, Terminal Island, Calif.

Regional Office, Regional Director
- Administration, Assistant Regional Director
- Fisheries, Associate Regional Director, La Jolla, Calif.
  - Fishery-Oceanography Center, La Jolla, Calif.
  - Marketing Program
  - Ocean Research Laboratory, Stanford, Calif.
  - Technological Laboratory
- Fishery Economic Services, Associate Regional Director
  - Data Collection office
  - Enforcement and Surveillance office
  - Financial Assistance office
  - Foreign Reporting office
  - Industry Services office, Los Angeles, Calif.
  - State Aid office

Hawaii Area, Honolulu, Hawaii

Area Office, Area Director
- Administration, Assistant Area Director
  - Biological Laboratory

Field operations with headquarters offices in Washington, D.C.
- Assistant Director for Marine Resources
  - National Center for Estuarine Studies, Beaufort, N.C.
  - Environmental Monitoring and Forecasting Program, Monterey, Calif.
  - National Center for Systematics—Washington, D.C.
- Assistant Director for Utilization and Engineering
  - National Center for Fish Protein Concentrate, College Park, Md.

[1] All laboratories and offices in same city as the Regional Office except as noted.

A map of the six regional and one area offices as of December 31, 1968, is shown in the frontispiece.

Employment

Employment for BCF averaged 2,454 throughout calendar year 1968 (1,931 permanent and 523 seasonal employees). The peak employment in 1968 was reported at the end of July when the staff was 1,928 permanent and 876 seasonal employees—a total of 2,804. With enactment of the Revenue and Expenditure Control Act of 1968 (Public Law 90-3640) and its limitations on permanent employment, the permanent staff had decreased from 1,943, as of June 30, to 1,905 by the end of 1968. Figure 3 shows the variations in the number of employees throughout 1968 and the relation between the total number and the number of permanent employees and seasonal, or temporary, employees.

BCF employees fall generally into four broad categories. Of the total 2,129 full-time employees reported as of October 31, 1968, 1,012 were

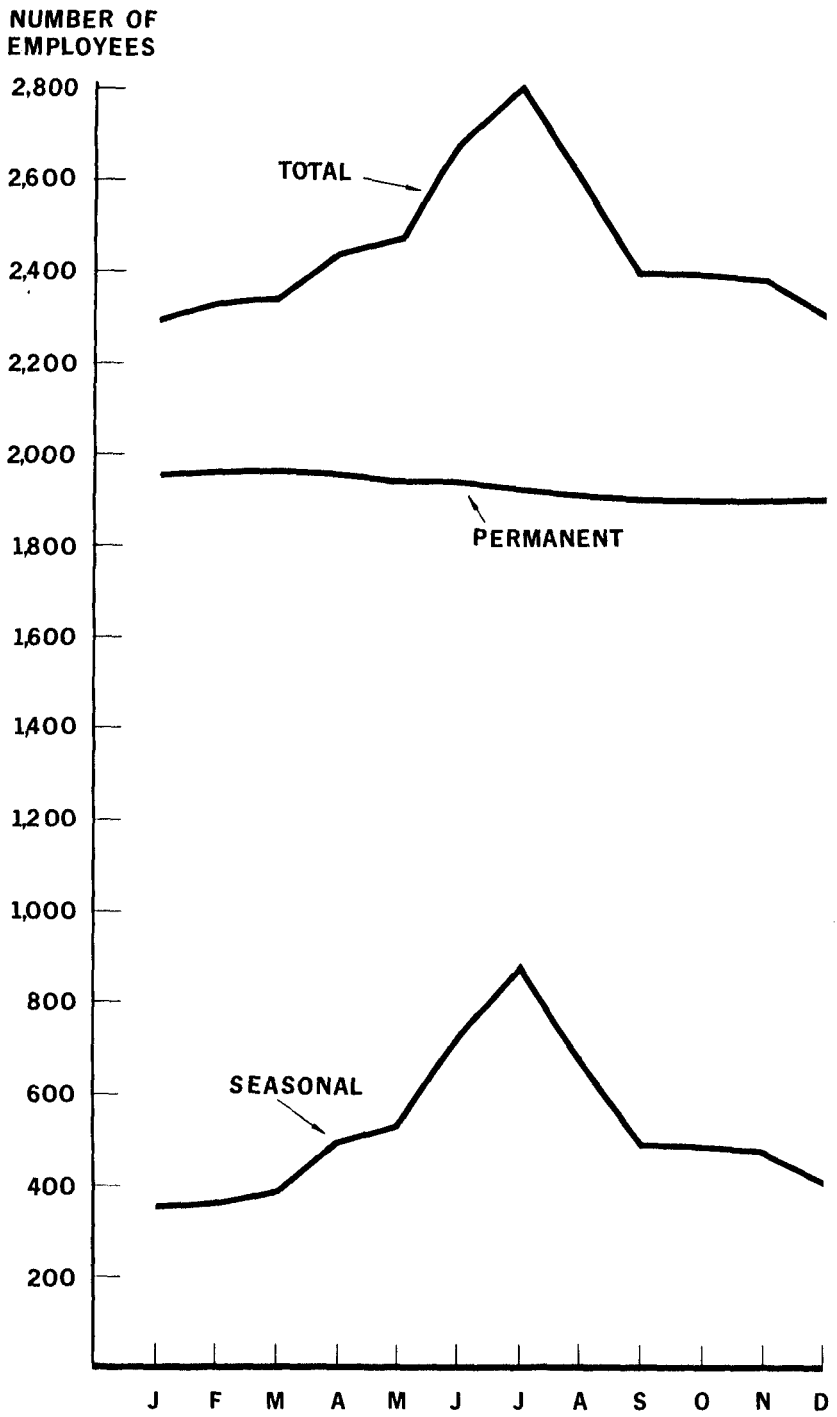


FIGURE 3.—Bureau of Commercial Fisheries employment totals by month, calendar year 1968.

classified in about 45 professional and technical series; 201 in 11 subprofessional series; 565 in 30 administrative and clerical series; and 351 were in positions, the pay of which is determined outside the Classification Act (214 vessel positions, 137 other). Figure 4 shows the grade structures for the professional and technical series, subprofessional series, and the clerical and administrative series and the number of employees in each grade for these three classifications as of October 31, 1968.

Budget

The BCF's budget for fiscal year 1969 provides for a $60.7 million obligational program (app. F). Of this amount, $44 million were from annual appropriations; $8.1 million from the permanent appropriation under Public Law 83–466, as amended (known as the Saltonstall-Kennedy Act); $4.3 million from receipts under the revolving fishery loan fund; $2.4 million from other Federal organizations for reimbursable work; $0.8 million from the fishing industry for inspecting and grading fishery products; $0.8 million from the Great Lakes Fishery Commission for work in the Great Lakes; and $0.3 million from Pribilof Islands fur seal receipts for payment to Alaska.

Figure 5 shows the available funds to carry out BCF's program for each year from 1957 to 1968.

Physical Properties

The principal properties of BCF are field bases, laboratories, stations, vessels, and installations on the Pribilof Islands (app. G). BCF has 29 large laboratories and bases, 69 smaller stations and offices, and 31 vessels of 40 feet and longer. Figures 6, 7, and 8 show the principal BCF fishery biological research laboratories, and figure 9 shows the principal BCF exploratory fishing and gear research bases and technological laboratories.

During fiscal year 1968, two construction projects continued. One project is the vessel *Delaware II*, which will be based at Gloucester, Mass., and used for biological studies, exploratory fishing, and gear research. The other project is the experimental tank area that BCF Biological Laboratory at Milford, Conn., will use for studying oyster genetics.

Figures 10 and 11 show the principal fishery research vessels of BCF.

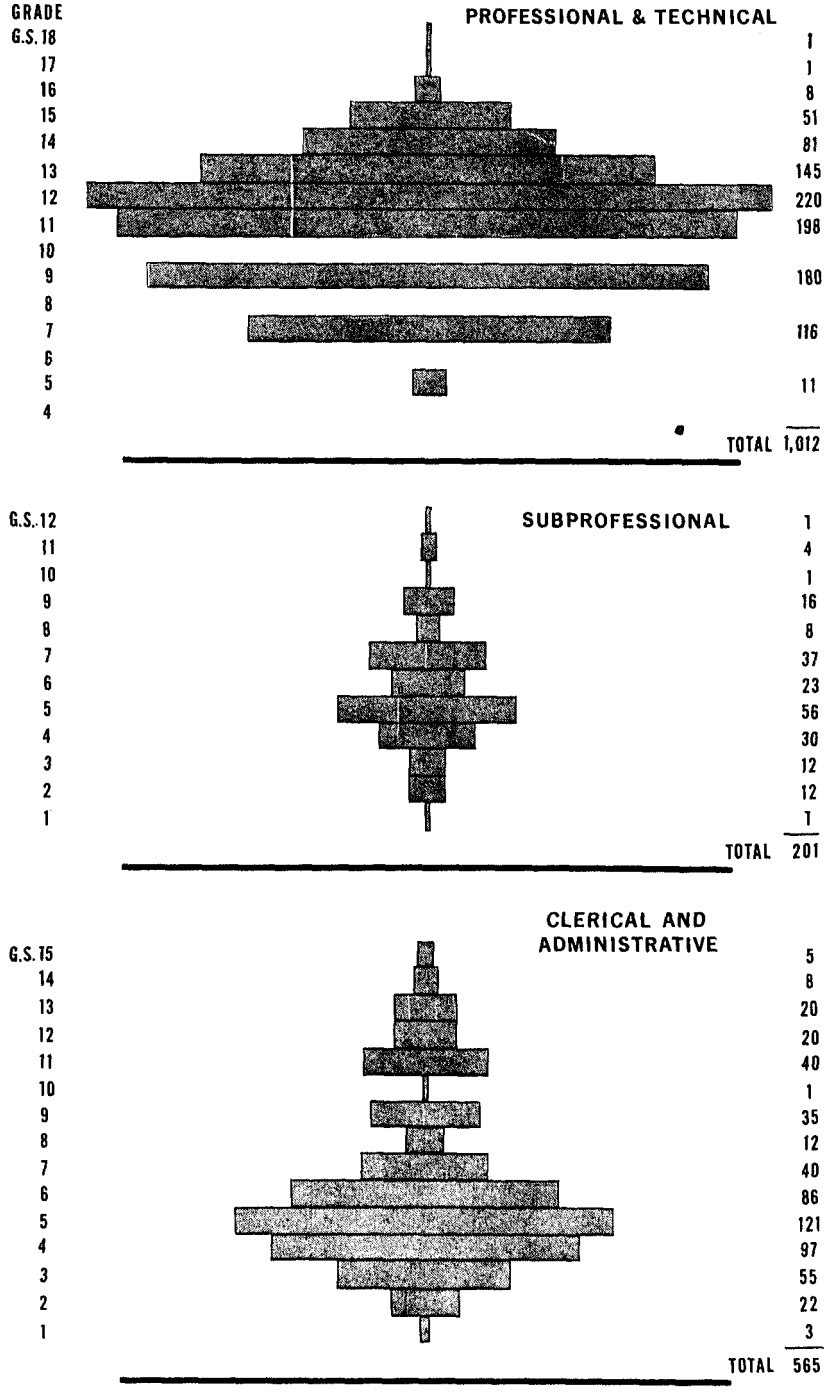


FIGURE 4.—Distribution by grade of professional and technical, subprofessional, and clerical and administrative employees, Bureau of Commercial Fisheries, October 31, 1968.

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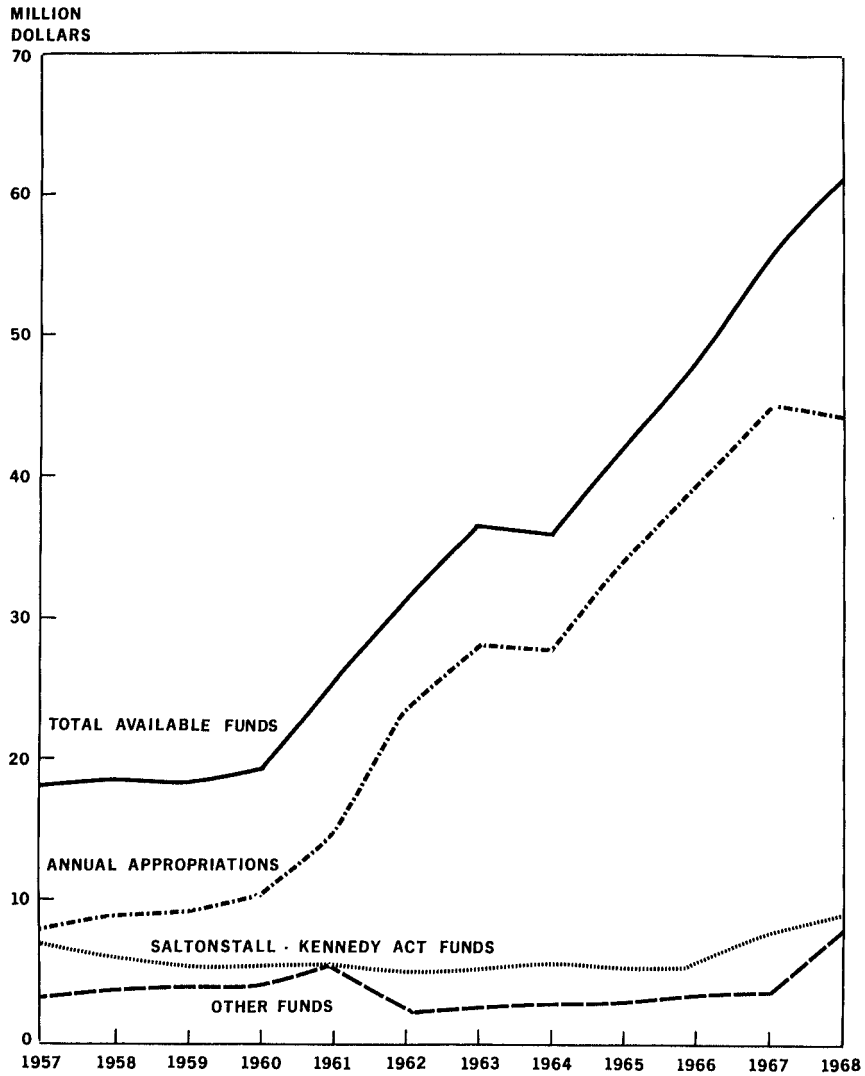

FIGURE 5.—Funds available to the Bureau of Commercial Fisheries, fiscal years 1957–68.

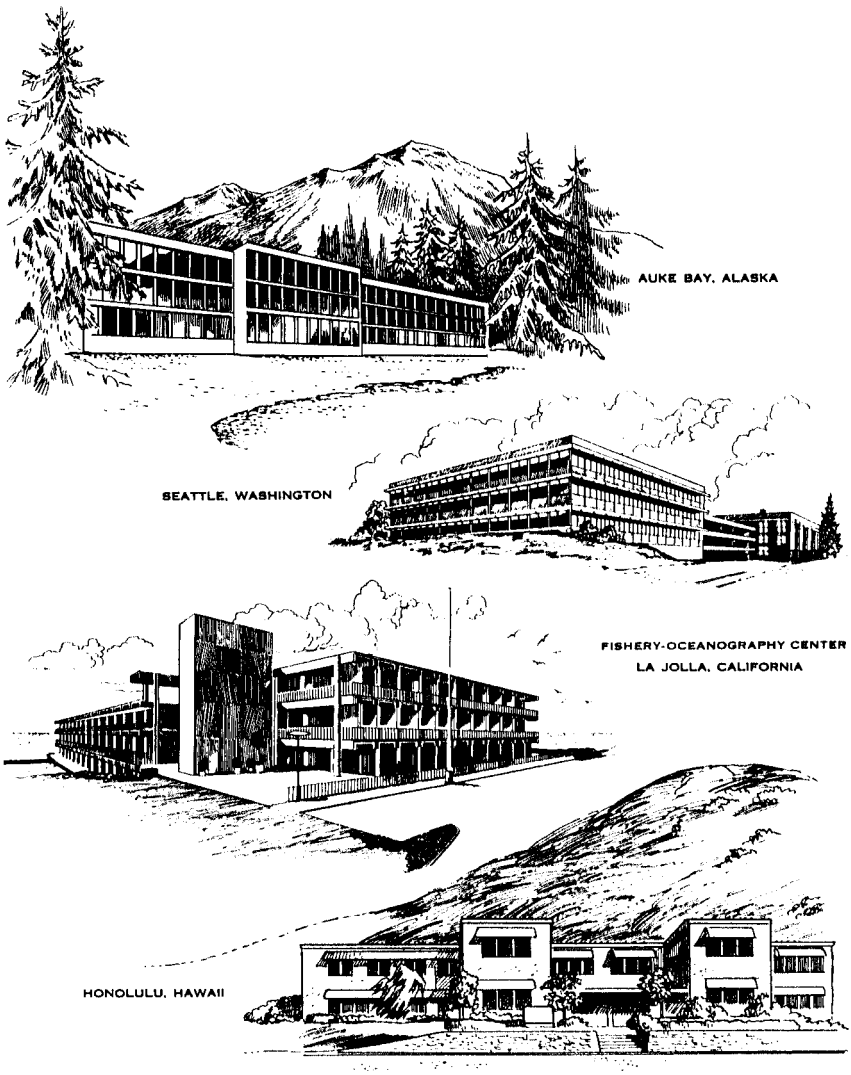

FIGURE 6.—Bureau of Commercial Fisheries Biological Laboratories, Pacific, 1968. The BCF Food Science and Technological Laboratories occupy the top floor of the new building in Seattle.

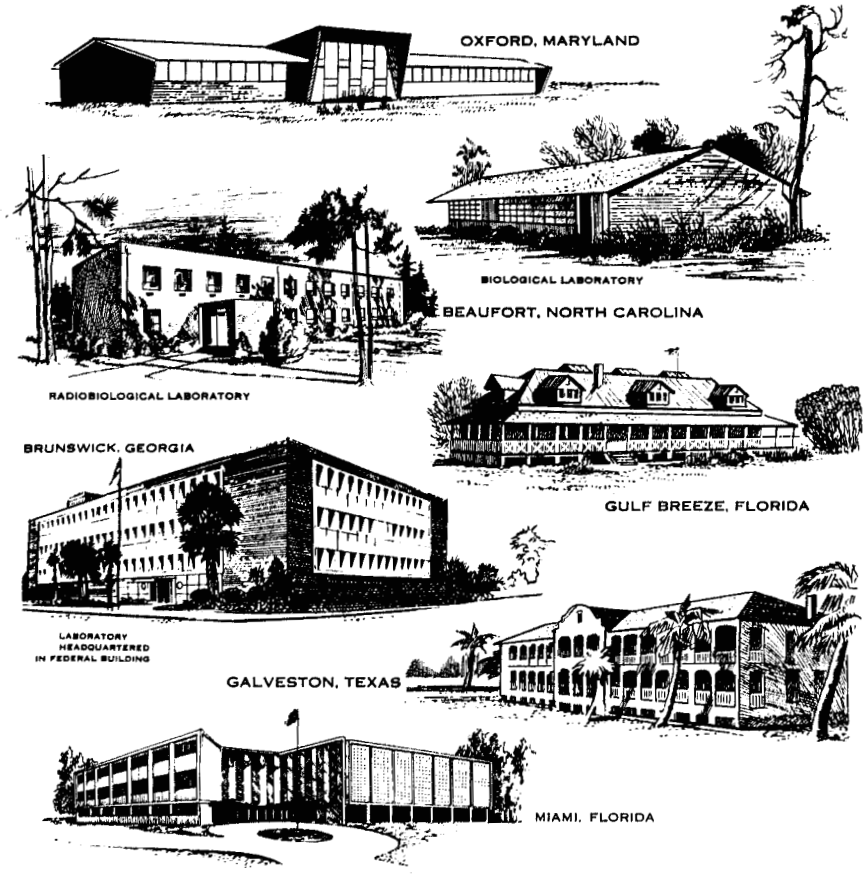

FIGURE 7.—Bureau of Commercial Fisheries Biological Laboratories, Middle and South Atlantic and Gulf Coasts, 1968.

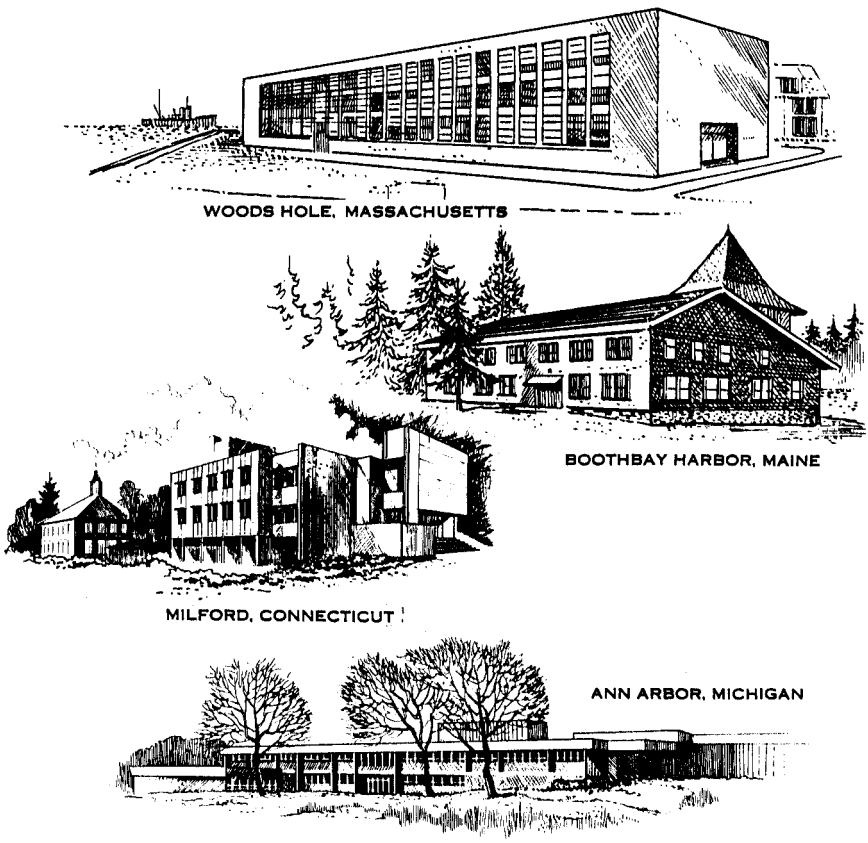

FIGURE 8.—Bureau of Commercial Fisheries Biological Laboratories, North Atlantic and Great Lakes, 1968. The Technological Laboratory in Ann Arbor occupies part of the Biological Laboratory.

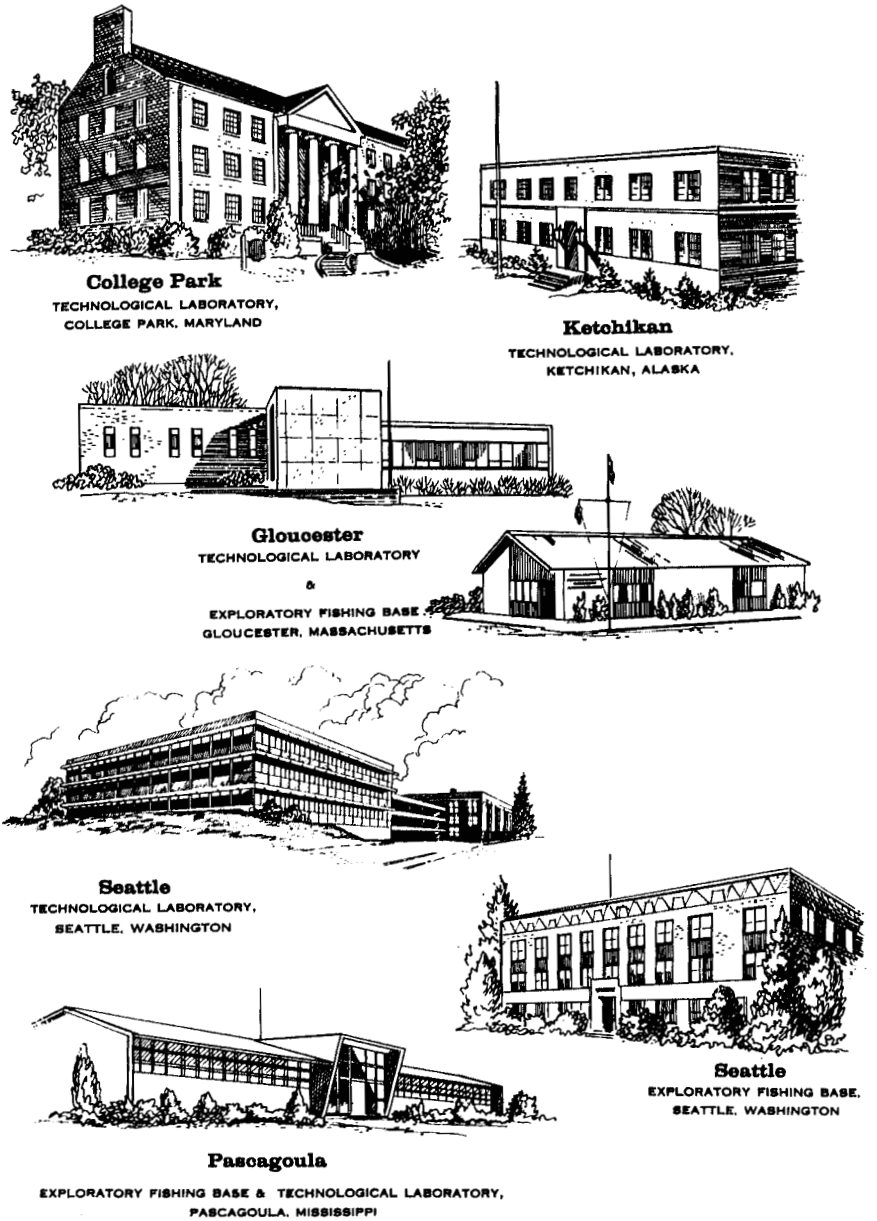

FIGURE 9.—Bureau of Commercial Fisheries Exploratory Fishing and Gear Research Bases and Technological Laboratories, 1968. The BCF Food Science and Technological Laboratories occupy the top floor of the new building in Seattle. The Exploratory Fishing Base in Ann Arbor is in the Regional Office. The Technological Laboratory in Ann Arbor occupies part of the Biological Laboratory.

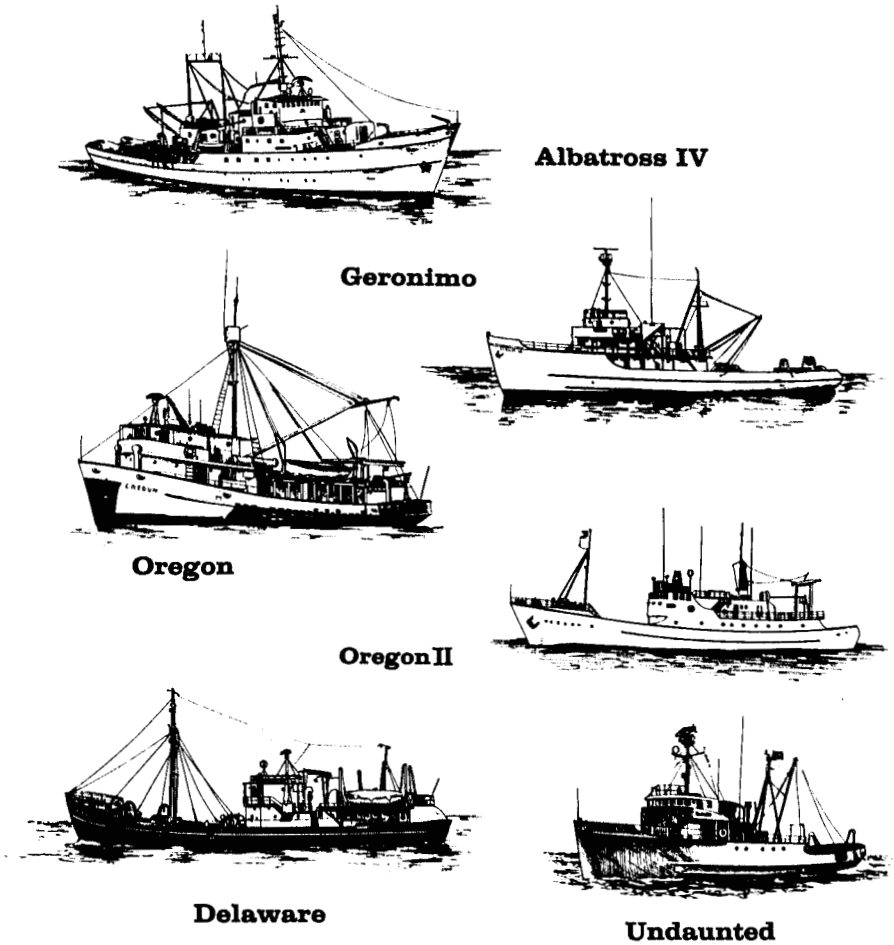

FIGURE 10.—Bureau of Commercial Fisheries principal research vessels operating in the Atlantic in 1968.

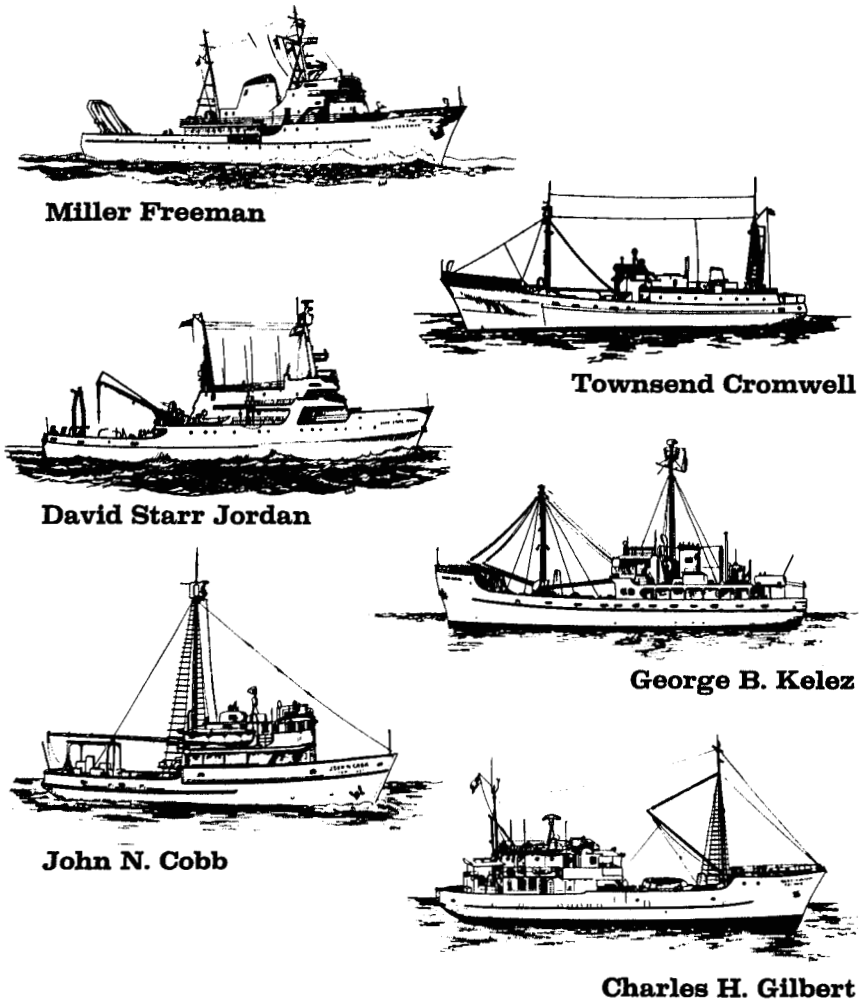

FIGURE 11.—Bureau of Commercial Fisheries principal research vessels operating in the Pacific in 1968.

Publications

Through its publications BCF tells the U.S. fishing industry, fishery scientists, and the general public of progress in its biological, chemical, economic, engineering, exploratory, marketing, oceanographic, and statistical activities.

These publications fall in three general categories. Forty-seven percent of the publications are contributions to scientific knowledge, particularly relating to fishery biology, fishery technology, and oceanography; 42 percent are statistical reports of interest to fishery researchers and the fishing industry; and the remaining 11 percent present popular information for the general public and nontechnical or semitechnical reports for the fishing industry.

Exclusive of the 1,672 Fishery Products Reports (5,344 pp.) which the seven Market News Service field offices issued five times a week, BCF sponsored 854 publications (13,208 pp.) in 1968. In the Fish and Wildlife Service series 490 reports (7,900 pp.) were published. The remaining 364 publications (5,308 pp.) appear in non-Service technical and trade journals. BCF employees wrote most of the publications; employees of research institutions under contract to BCF or using Federal Aid funds, and unpaid collaborators wrote the others.

Appendix H of this report describes the BCF series of publications and partially lists the publications issued in 1968.

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APPENDIXES

Appendix A—Fisheries of the United States

A–1.—*Employment, fishing craft, and establishments, calendar years, 1968 and 1967*

	1968	1967 [1]
Persons employed:	*Number*	*Number*
Fishermen	(2)	136,500
In fishery wholesaling and manufacturing establishments	(2)	88,624
Total	(2)	225,124
Craft used:		
Fishing:		
Vessels (5-net tons and over)	(2)	13,100
Motor boats	(2)	68,600
Other boats	(2)	2,500
Total	(2)	84,200
Fishing vessels, documentations issued:		
First documentations	(2)	718
Redocumentation	(2)	151
Total	(2)	869
Fishery shore establishments:		
Pacific Coast States	(2)	569
Atlantic Coast and Gulf States	(2)	2,809
Great Lakes and Mississippi River States	(2)	646
Hawaii	(2)	29
Total	(2)	4,053

[1] Data partially estimated.
[2] Not available.

A–2.—*U.S. landings of certain species, calendar years 1968 and 1967 and record catch*

Species	[1] 1968		1967		Record catch	
	Million pounds	*Million dollars*	*Million pounds*	*Million dollars*	*Year*	*Million pounds*
Menhaden	1,381	10	1,164	14	1962	2,348
Tuna [2]	294	47	328	44	1950	391
Crabs: blue, Dungeness, and king	238	44	315	30	1966	366
Shrimp	292	113	308	103	1967	308
Salmon	301	55	217	49	1936	644
Flounders, Atlantic and Gulf	113	14	113	14	1965	134
Haddock	71	9	98	11	1929	294
Alewives, Atlantic	63	1	59	1	1908	96
Ocean perch, Atlantic	62	2	71	3	1951	258
Whiting	78	3	70	2	1957	133
Anchovies, California	29	(3)	70	1	1953	86
Herring, sea, Atlantic	95	2	70	2	1902	201
Clams, Atlantic: surf, hard and soft meats	66	20	71	20	1966	72
Oysters (meats)	56	30	60	32	1908 [4]	152
Cod, Atlantic	49	4	44	4	1880	294
Halibut, Pacific	26	4	40	6	1915	67
Jack mackerel	57	2	38	1	1952	147
Mullet	30	3	34	2	1902	43
Hake, Pacific	8	(3)	20	(3)	1967	29
Lobster, northern	32	25	27	22	1968	32
Bonito	17	1	21	1	1967	21
Scup or porgy	14	2	20	3	1960	49
Herring, sea, Pacific	13	(3)	18	(3)	1937	263
Snapper, red	12	4	13	4	1965	23
Scallop, sea, Atlantic (edible meats)	14	16	10	8	1961	27
Striped bass, Atlantic	11	2	10	2	1968	11
Pollock	6	(3)	7	(3)	1938	41
Sea bass, black, Atlantic	4	1	5	1	1952	22
Mackerel, Pacific	2	(3)	1	(3)	1935	7
Sardine, Pacific	(3)	(3)	(3)	(3)	1936	1,50-
Other	682	49	724	60	----------	----------
Total	4,116	472	4,055	440	----------	----------

[1] Preliminary.
[2] Does not include landings of tuna by U.S. vessels in Puerto Rico.
[3] Less than 500,000 pounds or $500,000.
[4] First year in which an oyster survey was made.

A–3.—*Summary of processed fishery products, by quantity and value, calendar years 1968 and 1967*

Item	1968 [1]		1967	
	Quantity	Value	Quantity	Value
Packaged products, fresh and frozen:				
Fish:				
Not breaded:				
Fillets and steaks, raw:	*Thousand pounds*	*Thousand dollars*	*Thousand pounds*	*Thousand dollars*
Flounders	43,542	20,552	45,287	20,731
Groundfish, including ocean perch	55,121	21,414	71,034	26,909
Halibut	6,200	3,058	7,896	4,613
Other (including whale meat for animal feeding)	79,900	21,500	80,541	21,395
Total	184,763	67,124	204,758	73,648
Breaded, raw and cooked:				
Sticks	91,566	41,413	73,909	32,559
Fillets, portions and steaks	182,150	67,400	164,978	61,032
Shellfish:				
Not breaded:				
Shrimp	151,450	156,000	140,430	143,751
Other	150,700	125,000	141,094	119,369
Total	302,150	281,000	281,524	263,120
Breaded:				
Shrimp	103,652	98,544	94,230	85,319
Other	15,000	14,850	14,896	14,429
Total	118,652	113,394	109,126	99,748
Specialties, fish and shellfish	65,000	39,057	59,015	38,360
Total fresh and frozen	944,281	609,388	893,310	568,467
Canned:				
Fish and shellfish for human consumption:				
Tuna	397,063	267,167	388,845	261,527
Salmon	162,738	117,199	99,473	76,121
Sardines:				
Maine	39,764	19,294	29,260	13,862
Pacific	(2)	(2)	(2)	(2)
Mackerel	22,294	4,098	12,733	2,363
Clam products and specialties	65,740	21,902	69,085	23,146
Shrimp and specialties	20,712	27,824	17,815	24,728
Oyster and specialties	14,118	9,171	16,289	10,123
Squid	16,891	1,734	14,615	1,439
Other	38,930	24,695	50,624	32,401
Total for human consumption	778,250	493,084	698,739	445,710
Bait and animal food:				
Animal food	504,074	85,437	499,099	78,256
Salmon eggs for bait	574	2,116	554	1,597
Total bait and animal food	505,648	87,553	499,653	79,853
Total canned	1,283,898	580,637	1,198,392	525,563
Cured fish and shellfish:				
Salted	35,600	20,300	39,983	22,633
Smoked	27,950	30,740	31,522	34,399
Dried fish and shellfish and lutefisk	2,450	6,960	2,511	7,622
Total cured	66,000	58,000	74,016	64,654
Industrial products:				
Meal and scrap	469,464	30,122	422,378	26,038
Oil, body and liver	173,148	7,285	122,398	6,112
Fish solubles	143,666	3,707	140,350	4,588
Oyster shell lime and poultry grit	479,596	3,572	622,734	4,144
Marine pearl shell and mussel shell buttons	[4] 453	1,078	[4] 213	789
Other		24,174		19,356
Total industrial products		69,938		61,027
Grand total		1,317,963		1,219,711

[1] Preliminary.
[2] Included with other canned products.
[3] Includes freeze-dried products.
[4] Number of gross.

A–4.—*Foreign trade in fishery products, by quantity and value, calendar years 1968 and 1967*

Item	1968		1967	
	Quantity	Value	Quantity	Value
Imports:				
Edible:				
Fresh or frozen:	*Thousand pounds*	*Thousand dollars*	*Thousand pounds*	*Thousand dollars*
Fresh-water (not fillets)	27,156	10,794	26,937	10,683
Salt-water (not fillets)	659,928	100,251	550,494	90,199
Groundfish and ocean perch fillets	390,236	92,375	283,567	69,812
Other fillets	109,163	44,060	84,862	32,231
Shrimp	184,798	158,228	183,512	148,451
Lobsters:				
Common	16,753	16,388	15,568	15,070
Spiny	43,062	82,648	35,340	56,449
Scallops	14,581	15,709	13,461	9,314
Other shellfish	12,015	7,153	13,687	5,170
Canned:				
Anchovies	6,036	4,820	4,030	3,693
Bonito and yellowtail	893	321	1,633	480
Salmon	4,955	2,820	121	106
Sardines	58,867	18,787	52,439	16,510
Tuna	67,173	31,681	65,321	30,198
Crab meat	4,720	5,373	2,177	2,708
Lobsters	2,664	6,587	2,864	7,295
Oysters and oyster juice	14,499	5,640	16,114	5,845
Other	50,454	20,905	46,117	16,517
Cured:				
Dried, pickled, or salted:				
Cod, haddock, hake, pollock, and cusk	40,350	11,638	37,540	10,939
Herring	21,085	3,068	24,077	3,624
Other	2,626	1,251	2,540	995
Smoked or kippered	4,306	1,289	3,951	1,103
Other	5,045	1,379	3,185	909
Total edible	1,741,365	643,165	1,470,437	538,301
Nonedible:				
Fish and marine anima loils	[1] 8,659	4,485	[1] 7,919	4,845
Fish meal and scrap	[2] 855	82,517	[2] 651	72,992
Fish solubles	[2] 2	176	[2] 4	279
Other		92,326		91,466
Total nonedible		179,504		169,582
Grand total imports		822,669		707,883
Exports of domestic products:				
Edible:				
Fresh or frozen	50,323	29,539	53,578	30,191
Canned:				
Mackerel	305	66	538	116
Salmon	5,726	4,604	20,543	15,593
Sardines	3,033	1,314	1,373	488
Shrimp	4,467	4,758	5,255	5,585
Squid	11,955	1,418	12,787	1,562
Other	7,990	6,775	10,951	10,832
Total canned	33,476	18,935	51,447	34,176
Cured	7,009	8,371	2,915	3,157
Total edible	90,808	56,845	107,940	67,524
Nonedible:				
Fish and marine animal oils	65,129	2,700	76,816	4,674
Other		8,212		10,011
Total nonedible		10,912		14,685
Grand total exports		67,757		82,209

[1] In thousand gallons.
[2] In thousand tons.

Appendix B—New Legislation

Ship Mortgage Insurance—Interest Rate Increase

46 U.S.C. 1274(a)(5)

Amends title XI of the Merchant Marine Act of 1936 to provide that vessel mortgage insurance authorized by that act shall secure bonds, notes, or other obligations bearing interest (exclusive of premium charges for insurance and service charges, if any) at rates not to exceed such per centum per annum on the principal obligation outstanding as the Secretary of Commerce determines to be reasonable, taking into account the range of interest rates prevailing in the private market for similar loans and risks assumed by the Department of Commerce. Prior law provided a maximum interest rate of 5 percent or under certain conditions a maximum rate of 6 percent.

Under the terms of the Fish and Wildlife Act of 1956, the Secretary of the Interior is authorized to insure mortgages on fishing vessels under the authority of title XI of the Merchant Marine Act of 1936.

82 Stat. 180; Public Law 90-341; Act of June 15, 1968.

Study of Effects of Use of Chemicals on Fish and Wildlife (Pesticide Research)

16 U.S.C. 742d-1

The act of August 1, 1958, authorized comprehensive continuing studies of 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 the use of such chemicals.

In 1959 and 1965 the amount of the appropriation authorization and the term of the authority were changed. The act of July 11, 1968, enacted a further change by authorizing an appropriation of $3,500,000 annually for the fiscal years ending June 30, 1969, 1970, and 1971.

82 Stat. 338; Public Law 90-394; Act of July 11, 1968.

Fishing Vessels—Exemption From Certain Laws

46 U.S.C. 404, 88, 367, and 391a(1)

Under the terms of this act cannery tender and fishing tender vessels of not more than 500 gross tons, used in the salmon or crab fisheries of Oregon, Washington, and Alaska, are exempt from certain inspection and load-line laws for a period of 5 years.

This enactment permits the continuation of a practice in the salmon and crab fisheries of Washington, Oregon, and Alaska that has been followed since these fisheries were started. Because of the short fishing season, the location of can-

neries in isolated areas not served by commercial vessels, and the nature of the fishery itself, the use of fishing vessels as service vessels for transport of fish, supplies, and personnel has been an integral part of the operation. Lately, the Coast Guard has held the view that such service vessels should be documented as cargo vessels and meet the requirements of such documentation. This act permits the continuation of the historical practice for 5 years while a study of the situation is being made.

82 Stat. 341; Public Law 90-397; Act of July 11, 1968.

Northwest Atlantic Fisheries Act—Amendment

16 U.S.C. 981-991

Amends the Northwest Atlantic Fisheries Act (64 Stat. 1067) which authorizes enforcement of the provisions of the International Convention for the Northwest Atlantic Fisheries (ICNAF). The 1968 Act changes the definition of fish to include mollusks and includes mammals covered by the Convention. The amendment also clarifies an ambiguity in language of the prior law concerning the payment of travel expenses of members of the industry advisory committee.

82 Stat. 419; Public Law 90-420; Act of July 24, 1968.

Prohibition Against Activities in Support of Foreign Fishing Fleet in Territorial Waters or Contiguous Fishery Zone

16 U.S.C. 1964 Ed., Supp. IV, 1081-1085

Prior law (Public Law 88-308, 78 Stat. 194) makes it unlawful for foreign vessels to engage in the fisheries within the territorial waters of the United States or within any waters in which the United States has the same rights in respect to fisheries as it has in its territorial waters. Public Law 90-427 adds a further prohibition which would make it unlawful for foreign vessels to engage in activities in support of a foreign fishing fleet in such waters.

82 Stat. 445; Public Law 90-427; Act of July 26, 1968.

Estuaries and Their Natural Resources

16 U.S.C. 1221-1226

In order to provide a means for considering the need to conserve and restore the valuable estuarine areas of the United States in a manner that reasonably maintains a balance between conservation of natural resources and beauty on the one hand, and on the other, the need to develop estuarine areas for the growth and development of the Nation, the Secretary is authorized to conduct, directly or by contract, a study and inventory of the Nation's estuaries.

The action to be taken by the Secretary is to be in cooperation with the States, the Secretary of the Army and other Federal agencies. A report is to be made to the Congress through the President not later than January 30, 1970, including legislative recommendations and recommendations as to whether there should be a nationwide system of estuarine areas. Recommendations for the acquisition of any estuarine area are to be developed in consultation with the States, municipalities and other interested Federal agencies and no lands may be acquired by the United States until authorized by the Congress.

All Federal agencies in planning for the use or development of water and land resources shall give consideration to estuaries and their natural resources and the States and local subdivisions are to be encouraged to take into account the needs and opportunities for protecting estuaries in the development of plans which involve various Federal-State grant-in-aid programs.

An appropriation of $250,000 for fiscal year 1969 and a similar amount for fiscal year 1970 is authorized.

82 Stat. 625; Public Law 90–454; Act of August 3, 1968.

Fishermen's Protective Act of 1967

22 U.S.C. 1964 Ed., Supp. IV, 1971–1977

The act of August 27, 1954 (68 Stat. 883) provided that in a case where a vessel of the United States is seized by a foreign country on the basis of rights or claims not recognized by the United States and there is no dispute of material facts concerning the location or activity of the vessel, the Secretary of State is to take such action as he deems appropriate to protect the vessel and crew and secure their release. In addition, the vessel owner is to be reimbursed by the Secretary of the Treasury in an amount certified by the Secretary of State for any fines paid to secure such release.

The act of August 12, 1968, amends the earlier act by authorizing similar reimbursement for sums paid for license fees, registration fees, or any other direct charge. In addition, the later act provides that the Secretary of the Interior, upon application, shall enter into contracts with fishing vessel owners providing that in the case of seizures under the conditions stated above, the Secretary of the Interior shall guarantee the owner or charterer of such vessel for all actual costs except the fines, license fees, etc., taken care of by the Secretary of the Treasury. The actual costs to be guaranteed by the Secretary of the Interior are those resulting from damage to or destruction of the vessel, its gear and equipment; loss or confiscation of the vessel, gear and equipment; and dockage fees or utilities.

The guarantee extends also to the owner (or charterer) and the crew for the market value of fish caught before the seizure but lost by confiscation or spoilage during the period of detention; and for not to exceed 50 percent of the gross income lost as a direct result of the seizure and detention according to a formula provided in the act.

Where the guarantee runs to the owner and crew, the distribution by the Secretary will be made in accordance with the usual practices in that particular segment of the commercial fishing industry.

The Secretary of the Interior will, by regulation, establish rates to be paid by the owners for such guarantees but such rates will be set so as to recover the cost of administering the program and at least one-third of the cost of the guarantees to the Federal Government.

Under the terms of the act the Secretary of State shall take such action as he may deem appropriate to make and collect claims against a foreign country for amounts expended by the United States under any part of this act. If the offending country fails or refuses to make payment in full within 120 days, the Secretary of State is required to withhold, pending such payment, an amount equal to the unpaid claim from any funds programed for the current fiscal

year to the offending country under the provisions of the Foreign Assistance Act of 1961.

82 Stat. 729; Public Law 90-482; Act of August 12, 1968.

Fish Protein Concentrate—Change in Authorization for Plant Construction

16 U.S.C. 778d-778h

Public Law 89-701 (80 Stat. 1089) authorized, among other things, the appropriation of $1 million for the construction of a demonstration plant to manufacture fish protein concentrate. Also authorized was the appropriation of $1.555 million annually for a period of 5 fiscal years for leasing one additional demonstration plant, operation and maintenance of the plants authorized, and the conduct of research to develop economical processes for production of fish protein concentrate.

Public Law 90-549 changes the authorization to permit the use of the $1 million authorized for either the construction or leasing of one demonstration plant and permits the authorization of $1.555 million annually for 5 years beginning with fiscal year 1968 to be used for the construction or leasing of the one plant authorized, for the operation and maintenance of that one plant, and for the conduct of research to develop economical processes for production of fish protein concentrate.

82 Stat. 936; Public Law 90-549; Act of October 4, 1968.

Commercial Fisheries Research and Development Act of 1964

16 U.S.C. 1964 Ed., Supp. IV, 779-779f

Public Law 88-309 (78 Stat. 197) authorizes the Secretary to cooperate with the 50 States, the Commonwealth of Puerto Rico, and the Governments of the Virgin Islands, Guam, and American Samoa in carrying out research and development of the Nation's commercial fisheries through a Federal grant-in-aid program in which a part of the costs are borne by the States. Under its original terms the authorizations contained in the act would have expired on June 30, 1969.

Public Law 90-551 continues in effect the authorizations contained in the act until June 30, 1973.

82 Stat. 957; Public Law 90-551; Act of October 4, 1968.

Seizure of United States Fishing Vessels—Foreign Military Sales Act

22 U.S.C. 2753(b)

Section 3(b) of the Foreign Military Sales Act provides that no defense article or service shall be sold by the United States under the terms of the act to any country which seizes or takes into custody or fines a United States fishing vessel engaged in fishing more than 12 miles from the coast of that country. The President may waive this provision when he determines it to be important to the security of the United States and promptly so reports to the Congress.

82 Stat. 1322; Public Law 90-629; Act of October 22, 1968.

Appendix C—Fisheries Financial Assistance Programs

Fisheries Loan Program

C–1.—*Status of fisheries loan fund, June 30, 1968*

Funds appropriated		$18, 000, 000
Principal collected	$14, 398, 000	
Interest collected and accrued	2, 931, 000	
Total collected		17, 329, 000
Total		30, 329, 000
All expenses to end of fiscal year 1968	3, 782, 307	
Net loans approved	23, 743, 164	
Total		27, 525, 471
Balance		2, 803, 529

C–2.—*Cumulative totals, fiscal years 1967 and 1968, and totals, fiscal year 1968*

	Cumulative total				Total fiscal year 1968	
	As of June 30, 1967		As of June 30, 1968			
	Number	*Dollars*	*Number*	*Dollars*	*Number*	*Dollars*
Applications received	1, 975	51, 650, 004	2, 114	57, 264, 231	139	5, 614, 227
Applications approved	1, 041	24, 152, 641	1, 116	26, 593, 756	75	2, 441, 115
Applications declined	488	10, 893, 005	518	12, 056, 658	30	1, 163, 653
Applications ineligible	134	3, 528, 972	139	3, 642, 972	5	114, 000
Being processed	14	1, 040, 776	13	980, 933		

C–3.—*Cumulative totals, fiscal years 1967 and 1968, and totals, fiscal year 1968*

Region	Cumulative total				Total fiscal year 1968	
	As of June 30, 1967		As of June 30, 1968			
	Number	*Dollars*	*Number*	*Dollars*	*Number*	*Dollars*
Northeast:						
Applications received	419	12, 839, 121	440	13, 817, 233	21	978, 112
Applications approved	218	5, 587, 357	229	6, 050, 932	11	463, 575
California:						
Applications received	267	14, 191, 242	289	15, 773, 449	22	1, 582, 207
Applications approved	164	6, 802, 946	178	7, 282, 283	14	479, 337
Gulf and South Atlantic:						
Applications received	389	9, 844, 489	411	10, 867, 948	22	1, 023, 459
Applications approved	147	3, 902, 191	154	4, 197, 262	7	295, 071
Pacific Northwest:						
Applications received	396	8, 384, 167	437	9, 330, 588	41	946, 421
Applications approved	237	4, 725, 466	263	5, 525, 575	26	800, 109
Alaska:						
Applications received	431	5, 467, 583	462	6, 503, 011	31	1, 035, 428
Applications approved	244	2, 784, 893	261	3, 187, 916	17	403, 023
Great Lakes:						
Applications received	49	530, 332	50	540, 332	1	10, 000
Applications approved	15	142, 920	15	142, 920	0	0
Hawaii:						
Applications received	23	391, 070	24	429, 670	1	38, 600
Applications approved	15	205, 068	15	205, 068	0	0
Puerto Rico:						
Applications received	1	2, 000	1	2, 000	0	0
Applications approved	1	1, 800	1	1, 800	0	0

C–4.—*Authorized use of loan proceeds, percentage by area*

[From beginning of program through fiscal year 1968]

	Debt payment	Improvements	Other
New England and Middle Atlantic	43	56	01
South Atlantic and Gulf	50	49	01
California	39	59	02
Pacific Northwest	39	60	01
Great Lakes	38	62	0
Alaska	25	75	0
Hawaii and Puerto Rico	46	50	04
Total	40	59	01

C–5.—*Loan applications received monthly, fiscal years 1957–68*

	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968
	Number											
July		17	9	15	8	19	6	5	13	4	10	8
August		17	12	13	10	16	7	2	10	10	12	9
September		14	10	9	7	16	11	21	22	14	12	16
October		12	7	16	6	14	13	14	21	16	28	17
November		18	13	9	19	26	7	16	14	22	22	18
December	88	11	13	15	21	14	8	15	15	18	19	15
January	16	14	10	16	18	29	5	12	12	31	18	8
February	41	18	12	27	26	19	12	13	8	19	4	15
March	40	22	15	28	13	19	11	18	12	14	7	10
April	22	22	14	13	18	16	12	48	13	11	6	13
May	28	11	10	19	31	9	2	36	10	16	3	6
June	30	9	12	10	7	11	5	19	7	11	4	4
Total	265	185	137	190	184	208	99	219	157	186	145	139

C–6.—*Amounts applied for monthly, fiscal years 1957–68*

	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968
July		$274,524	$251,571	$830,182	$134,196	$532,305	$141,780	$136,794	$346,404	$34,900	$462,852	$322,233
August		931,110	363,000	234,465	275,972	297,614	223,021	11,718	213,015	223,249	566,800	317,585
September		607,851	385,517	465,610	176,781	438,773	117,243	233,864	544,554	150,752	809,886	1,269,709
October		204,635	62,532	305,150	195,095	145,443	132,107	243,298	199,273	177,585	640,425	580,446
November		375,583	153,559	124,905	428,011	296,877	144,267	296,669	256,687	341,360	518,516	376,328
December	$2,533,020	160,670	331,502	198,161	425,076	182,876	275,415	350,103	265,783	408,475	573,990	495,363
January	377,485	520,323	153,501	344,197	203,752	907,519	68,100	1,087,030	272,845	707,009	559,771	281,450
February	1,458,748	305,318	115,000	554,425	665,798	195,612	111,670	1,001,800	48,970	529,390	51,037	407,480
March	2,563,703	862,325	185,069	698,063	692,766	390,959	119,470	194,515	138,085	388,197	229,128	340,109
April	629,131	336,888	189,871	226,542	426,453	321,438	102,661	830,592	124,500	163,115	338,913	974,852
May	2,276,774	642,025	185,869	1,003,874	877,990	86,911	23,000	569,175	247,657	374,893	119,899	182,672
June	948,437	224,652	291,980	343,372	216,160	262,927	132,444	285,097	236,165	225,600	320,068	66,000
Total	10,787,298	5,445,904	2,668,971	5,328,946	4,718,050	4,059,254	1,591,178	5,240,655	2,893,938	3,724,525	5,191,285	5,614,227

Fishing Vessel Construction Differential Subsidy Program

C–7.—*Contracts executed each fiscal year*

	Fiscal year 1965		Fiscal year 1966		Fiscal year 1967		Fiscal year 1968		Cumulative totals	
	Number	*Dollars*	*Number*	*Dollars*	*Number*	*Dollars*	*Number*	*Dollars*	*Number*	*Dollars*
New England	1	155,613	7	1,091,154	8	6,766,937	1	458,510	17	8,472,213
California					2	1,705,600	6	5,203,479	8	6,909,079
Gulf										
Pacific Northwest					1	217,585			1	217,585
Alaska										
Total	1	155,613	7	1,091,154	11	8,690,122	7	5,661,989	26	15,598,877

Fishing Vessel Mortgage and Loan Insurance Program

C–8.—*Cumulative totals, fiscal years 1961 through 1968—totals, fiscal year 1968*

Region	Cumulative totals																	
	As of June 30, 1961		As of June 30, 1962		As of June 30, 1963		As of June 30, 1964		As of June 30, 1965		As of June 30, 1966		As of June 30, 1967		As of June 30, 1968		Total fiscal year 1968	
	No.	*Dollars*	*No.*	*Dollars*	*No.*	*Dollars*	*No.*	*Dollars*	*No.*	*Dollars*	*No.*	*Dollars*	*No.*	*Dollars*	*No.*	*Dollars*	*No.*	*Dollars*
Northeast:																		
Applications received	3	160,000	9	804,500	11	1,054,500	11	1,054,500	13	1,464,500	15	1,796,750	22	2,932,330	22	2,932,330	0	0
Applications approved	2	120,000	4	231,250	8	775,365	8	775,365	9	1,034,928	11	1,367,178	15	1,916,678	16	2,271,678	1	355,000
California:																		
Applications received			1	557,000	1	557,000	1	557,000	2	1,262,000	2	1,262,000	12	8,239,375	12	8,239,375	0	0
Applications approved			1	557,000	1	557,000	1	557,000	2	1,262,000	2	1,262,000	10	7,550,825	11	8,641,825	1	1,091,000
Gulf and South Atlantic:																		
Applications received	2	56,500	3	95,060	13	458,740	33	1,384,090	49	2,806,646	85	4,816,524	111	6,196,092	160	9,811,010	49	3,614,918
Applications approved	1	34,500	3	95,060	10	253,504	31	965,119	43	1,962,969	66	3,092,169	94	4,584,259	134	7,432,410	40	2,848,151
Pacific Northwest:																		
Applications received	2	425,000	4	848,000	6	1,827,500	7	1,846,250	8	1,861,250	13	2,127,375	15	2,558,625	17	3,038,625	2	480,000
Applications approved	1	75,000	3	488,046	4	507,546	5	526,296	5	526,296	8	635,535	8	635,535	12	1,550,692	4	915,157
Alaska:																		
Applications received							3	54,774	5	75,596	7	375,596	7	375,596	7	375,596	0	0
Applications approved							3	54,774	4	64,774	6	364,774	6	364,774	6	364,774	0	0

Appendix D—American Fisheries Advisory Committee Membership, 1968

[Authorized by Act of July 1, 1954 (68 Stat. 376)]

Chairman: Leslie L. Glasgow, *Assistant Secretary of the Interior for Fish and Wildlife, Parks, and Marine Resources*

Harry Heber Bell
Harry H. Bell & Sons, Inc.,
2001 Pass-a-Grille Way,
St. Petersburg Beach, Fla. 33706

Samuel H. Bloom
Crocker & Winsor,
23 Fish Pier,
Boston, Mass. 02210

Gerald I. Bolda
Bolda Fisheries, Inc.,
2310 North Richards Street,
Milwaukee, Wis. 53212

Lawrence I. Clarke
Atlantic Processing Co.
Drawer 248,
Amagansett, Long Island, N.Y. 11930

Clifton D. Day, Manager
Sea Food Division,
Del Monte Corp.,
215 Fremont Street,
San Francisco, Calif. 94119

Ammon G. Dunton
Dunton, McLeod & Simmons,
White Stone, Va. 22578

Jacob Dykstra, President
Point Judith Fishermen's
Cooperative Association,
Point Judith, R.I. 02882

Arthur H. Frohman
L. H. Frohman & Sons, Inc.,
510 North Dearborn Street,
Chicago, Ill. 60610

Jack Gorby
Food Division,
Westgate-California Corp.,
1995 Bay Front Street,
San Diego, Calif. 92101

Sigfryed Jaeger
12519 Corliss North,
Seattle, Wash. 98133

Thomas D. McGinnes, President
Virginia Seafoods, Inc.,
Irvington, Va. 22480

John Mehos
Liberty Corporations,
P.O. Box 267,
7th & Wharf,
Galveston, Tex. 77551

Roy Prewitt
American Fish Farmers Federation
P.O. Box 191,
Lonoke, Ark. 72086

Ralph A. Richards
A. A. Richards & Co., Inc.,
Alabama State Docks,
P.O. Box 318,
Mobile, Ala. 36601

W. A. Ritter, President
Pan-Alaska Fisheries, Inc.,
1818 Westlake North,
Seattle, Wash. 98109

John J. Royal, Secretary-Treasurer
Fishermen & Allied Workers' Union,
Local 33, I.L.W.U.,
806 South Palos Verdes Street,
San Pedro, Calif. 90731

Arthur O. Salasnek
Salasnek Fisheries, Inc.,
2140–80 Wilkins Street,
Detroit, Mich. 48207

John Salvador
S. Salvador & Sons Co.,
P.O. Box 462,
158 King Street,
St. Augustine, Fla. 32084

Theodore H. Shepard
Schulman-Shepard, Inc.,
944 International Trade Mart,
New Orleans, La. 70130

W. O. Smith
3104 Tongass Avenue,
Ketchikan, Alaska 99901

Rupert R. Bonner, Executive Secretary
Bureau of Commercial Fisheries

Appendix E—Organizations With Which the Bureau Had Research and Development Contracts and Grants in 1968

Organization	*Principal location*
Alabama Department of Conservation	Montgomery, Ala.
Alabama, University of	University, Ala.
Alaska Department of Fish and Game	Juneau, Alaska
Alaska, University of	College, Alaska
American Samoa	Pago Pago, American Samoa
Arizona Game and Fish Department	Phoenix, Ariz.
Arkansas Game and Fish Commission	Little Rock, Ark.
Auburn University	Auburn, Ala.
Barkley and Dexter Laboratories, Inc	Fitchburg, Mass.
Bears Bluff Laboratories	Wadmalaw Island, S.C.
California Academy of Sciences	San Francisco, Calif.
California Department of Fish and Game	Sacramento, Calif.
California, University of	Berkeley, Calif.
Colorado Game, Fish and Parks Department	Denver, Colo.
Columbia University	Palisades, N.Y.
Connecticut Board of Fisheries and Game	Hartford, Conn.
Delaware Board of Game and Fish Commissioners	Dover, Del.
Delaware Commission of Shell Fisheries	Dover, Del.
Delaware, University of	Newark, Del.
Essex Marine Laboratory, Inc	Essex, Conn.
Esso Research and Engineering Co	Linden, N.J.
Florida Board of Conservation	Tallahassee, Fla.
Florida State University	Tallahassee, Fla.
Florida, West, University of	Pensacola, Fla.
FMC Corporation	Santa Clara, Calif.
Food Chemical and Research Laboratory, Inc	Seattle, Wash.
Georgetown University	Washington, D.C.
Georgia State Game and Fish Commission	Atlanta, Ga.
Georgia, University of	Athens, Ga.
Guam Division of Fish and Wildlife	Agana, Guam
Harvard University	Cambridge, Mass.
Hawaii Department of Land and Natural Resources	Honolulu, Hawaii
Hawaii, University of	Honolulu, Hawaii
Idaho Department of Fish and Game	Boise, Idaho
Illinois Department of Conservation	Springfield, Ill.
Indiana Division of Fish and Game	Indianapolis, Ind.
Inter-American Tropical Tuna Commission	La Jolla, Calif.
Iowa State Conservation Commission	Des Moines, Iowa

Organization	*Principal location*
Iowa State University	Ames, Iowa
Kansas Forestry, Fish and Game Commission	Pratt, Kans.
Kansas State University	Manhattan, Kans.
Kentucky Department of Fish and Wildlife Resources	Frankfort, Ky.
Long Beach State College	Long Beach, Calif.
Long Island University	Brooklyn, N.Y.
Louisiana State University	Baton Rouge, La.
Louisiana Wildlife and Fisheries Commission	New Orleans, La.
Maine Department of Sea and Shore Fisheries	Augusta, Maine
Maryland Department of Chesapeake Bay Affairs	Annapolis, Md.
Maryland, University of	College Park, Md.
Massachusetts Department of Natural Resources	Boston, Mass.
Massachusetts Institute of Technology	Cambridge, Mass.
Massachusetts, University of	Amherst, Mass.
Mercer County Community College	Trenton, N.J.
Miami, University of	Miami, Fla.
Michigan, Department of Natural Resources	Lansing, Mich.
Michigan State University	East Lansing, Mich.
Michigan, University of	Ann Arbor, Mich.
Minnesota Department of Conservation	St. Paul, Minn.
Mississippi Marine Conservation Commission	Biloxi, Miss.
Mississippi State University	State College, Miss.
Missouri Department of Conservation	Jefferson City, Mo.
Montana Fish and Game Department	Helena, Mont.
Nebraska Game, Forestation and Park Commission	Lincoln, Nebr.
Nevada Fish and Game Commission	Reno, Nev.
New Hampshire Fish and Game Commission	Concord, N.H.
New Jersey Department of Conservation	Trenton, N.J.
New Mexico State Game Commission	Santa Fe, N. Mex.
New York Department of Conservation	Albany, N.Y.
North Carolina Department of Conservation and Development	Raleigh, N.C.
North Carolina State University	Raleigh, N.C.
North Carolina, University of	Chapel Hill, N.C.
North Dakota Game and Fish Department	Bismarck, N. Dak.
Northeastern University	Boston, Mass.
Ocean Harvester, Inc	Los Angeles, Calif.
Ohio Division of Wildlife	Columbus, Ohio
Ohio State University	Columbus, Ohio
Oklahoma Department of Wildlife Conservation	Oklahoma City, Okla.

Organization	*Principal location*
Oklahoma State University	Stillwater, Okla.
Oregon State Fish Commission	Portland, Oreg.
Oregon State University	Corvallis, Oreg.
Oregon, University of	Eugene, Oreg.
Pacific Salmon Inter-Agency Council	Portland, Oreg.
Pennsylvania Fish Commission	Harrisburg, Pa.
Puerto Rico Department of Agriculture	San Juan, P.R.
Rhode Island Department of Natural Resources	Providence, R.I.
Rhode Island, University of	Kingston, R.I.
Rutgers University	New Brunswick, N.J.
South Carolina Department of Wildlife Resources	Wadmalaw Island, S.C.
South Dakota Department of Fish, Game and Parks	Pierre, S. Dak.
Tennessee Game and Fish Commission	Nashville, Tenn.
Texas Department of Parks and Wildlife	Austin, Tex.
Texas, University of	Austin, Tex.
Trenton State College	Trenton, N.J.
Utah State Department of Fish and Game	Sat Lake City, Utah
Vermont Fish and Game Department	Montpelier, Vt.
Virgin Islands, Office of the Governor	St. Thomas, V.I.
Virginia Commission of Fisheries	Newport News, Va.
Virginia Institute of Marine Science	Gloucester Point, Va.
Virginia Polytechnic Institute	Blacksburg, Va.
Washington Department of Fisheries	Olympia, Wash.
Washington State University	Pullman, Wash.
Washington, University of	Seattle, Wash.
West Virginia Department of Natural Resources	Charleston, W. Va.
Wisconsin Department of Conservation	Madison, Wis.
Wisconsin, University of	Madison, Wis.
Woods Hole Oceanographic Institution	Woods Hole, Mass.
Wyoming Game and Fish Commission	Cheyenne, Wyo.
Yale University	New Haven, Conn.

Appendix F—Budget for Fiscal Year 1969—Obligational Program

[In thousands of dollars]

Function	Appropriations												Other funds		Total
	Management and investigations of resources	Special foreign currency program	Construction	Construction of fishing vessels	Federal aid research and development	Anadromous and Great Lakes	Payment to Alaska	Administration of Pribilof Islands	Fishery promotion and development	General administrative expenses	Fishermen's protective fund [1]	Fishery loan fund	Trust funds	Reimbursements	
Management	580													8	588
Marketing and technology	7,691	91							3,178				788	1,016	12,664
Research	12,859	67							4,345				843	831	18,945
Research on fish migration over dams	1,454								57					322	1,833
Fishing vessel mortgage insurance	48														48
Columbia River fishery facilities	2,604		438											150	3,192
Construction of fishery facilities			394												394
Construction of fishing vessels				6,173											6,173
General administrative services									520	765					1,285
Aid to States and other cooperators					5,839	2,307									8,146
Administration of Pribilof Islands								2,356						50	2,406
Fur seal research								298							298
Payment to Alaska from Pribilof Islands receipts							310								310
Fishermen's Protective Program											130				130
Loans to fisheries												4,314			4,314
Total	25,136	158	832	6,173	5,839	2,307	310	2,654	8,100	765	[1] 130	4,314	1,631	2,377	60,726

[1] Supplemental appropriation proposed to begin this program.

Appendix G—Physical Properties

G–1.—*Principal laboratories and installations, calendar year 1968*

Location	Type	Principal use	Gross valuation [1]
Alaska:			
Auke Bay	Biological Laboratory	Biological research	$436,000
Gibson Cove	Laboratory, office, and warehouse.	Enforcement and surveillance, technology and biological field stations, and exploratory fishing and gear research.	398,175
Juneau	Exploratory Fishing and Gear Research Base, warehouse, and shops.	Exploratory fishing and gear research, vessel maintenance.	[2] 145,000
Ketchikan	Technological Laboratory	Technological research	195,000
Pribilof Islands	Fur seal processing facilities and native villages.	Management of Alaska fur seals	4,428,000
California, La Jolla	Fishery-Oceanography Center	Biological research	2,600,000
Connecticut, Milford	Biological Laboratory	do	1,316,400
District of Columbia, U.S. National Museum.	Systematics Laboratory	do	[3]
Florida:			
Gulf Breeze	Biological Laboratory	do	62,000
Miami	do	Biological research, statistics, and market news reporting.	1,500,000
St. Petersburg Beach	do	Biological research	5,700
Georgia:			
Brunswick	do	do	[3]
St. Simons Island	Exploratory Fishing and Gear Research Station.	Exploratory fishing and gear research.	5,000
Hawaii, Honolulu	Biological Laboratory	Biological research, loans and grants, statistics.	315,000
Maine, Boothbay Harbor	do	Biological research	289,015
Maryland:			
Beltsville	Processing Plant	Processing of fish protein concentrate.	[3]
College Park	Technological Laboratory	Technological research, home economics.	[4] 134,110
Oxford	Biological Laboratory	Biological research	207,000
Massachusetts:			
Gloucester	Technological Laboratory	Technological research, fishery products inspection.	367,080
Do	Marine Products Irradiator	Research on irradiation of fishery products.	[5]
Do	Exploratory Fishing and Gear Research Base.	Exploratory fishing and gear research.	65,000
Woods Hole	Biological Laboratory	Biological research	1,029,000
Michigan, Ann Arbor	Biological Laboratory, Technological Laboratory, Exploratory Fishing and Gear Research Base, Marketing Office.	Biological research, technological research, statistics, exploratory fishing and gear research, market development.	[2] 1,441,173
Mississippi, Pascagoula	Exploratory Fishing and Gear Research Base, Technological Laboratory, Marketing Office.	Exploratory fishing and gear research, market development, biological and technological research, market development.	370,000
North Carolina, Beaufort	Biological Laboratory, Statistics Office, and Radiobiological Laboratory.	Biological research, statistics, and research in radiobiology.	595,000
Oregon, Portland	Columbia River Fisheries Program Office.	Columbia River fisheries development.	[3]
Texas, Galveston	Biological Laboratory and Statistics Office.	Biological research and statistics.	351,000
Washington, Seattle	Biological Laboratory, Technological Laboratory, Exploratory Fishing and Gear Research Base, Pioneer Laboratory, Marketing, dock and warehouse.	Biological, technological, and food science research, exploratory fishing and gear research, Pribilof Islands supply, fishery products inspection, market development.	[2] 2,264,000

[1] Figures represent original acquisition or construction costs for owned property only.
[2] Installations at this location are both owned and leased by Bureau of Commercial Fisheries.
[3] Installation not owned by Bureau of Commercial Fisheries. Includes property held under leases, cooperative agreements, and use permits.
[4] Retained by Bureau of Commercial Fisheries under agreement pending conveying to University of Maryland pursuant to Public Law 89-227.
[5] Owned by Atomic Energy Commission and operated by Bureau of Commercial Fisheries.

G–2.—*Minor field research stations, market news offices, exploratory fishing stations, market development offices, and statistical offices, calendar year 1968*

Location	Type	Principal use	Gross valuation [1]
Alabama, Bayou LaBatre.	Market News and Statistical Field Office.	Market News and statistics	(2)
Alaska:			
Brooks Lake	Field Research Station	Biological research	44,000
Juneau	Statistical Field Office	Statistics	(3)
Kurluk Lake	Field Research Station	Biological research	27,000
Kasitsna Bay	do	do	12,000
Little Port Walter	do	do	158,000
Olsen Bay	do	do	7,000
St. Paul Island	do	do	(4)
Traitors Cove	do	do	8,000
Arkansas:			
Kelso	Exploratory Fishing and Gear Research Station.	Exploratory fishing and gear research.	(2)
Little Rock	Marketing Office	Marketing	(2)
California:			
Los Angeles	Inspection Office	Inspection	(2)
San Francisco	Marketing and Inspection Office.	Marketing, inspection	(2)
Terminal Island	Marketing Office, Technological Laboratory, Market News and Statistics Office.	Technological research, fishery products inspection, market news and statistics reporting.	(2)
Florida:			
Apalachicola	Market News and Statistical Field Office.	Market news and statistics reporting.	(2)
Fort Myers	do	do	(2)
Key West	do	do	(2)
St. Petersburg	Fishery inspection, Federal aid, loans and grants, river basin studies, and marketing.	Fishery products inspection, Federal aid, loans and grants, river basin studies, and market development.	(2)
Tampa	Market News and Statistical Field Office.	Market news and statistics reporting.	(2)
Georgia:			
Atlanta	Marketing Office	Marketing development	(2)
Savannah	Statistical Field Office	Statistics reporting	(2)
Idaho, Boise	Field Research Station	River basin studies	(2)
Illinois:			
Chicago	Market News Office, Fishery Products Inspection Office.	Market news reporting, fishery products inspection.	(2)
Do	Marketing Office	Marketing	(2)
Louisiana:			
Galiano	Statistical Field Office	Statistics reporting	(2)
Houma	do	do	(2)
Morgan City	do	do	(2)
New Orleans	Market News Office, Statistical Field Office.	do	(2)
Maine:			
Portland	Field Office	Statistics, market news, enforcement.	(2)
Rockland	do	do	(2)
West Boothbay Harbor.	Statistical Field Office	Statistics	(2)
Maryland, Baltimore	Market News Office, marketing	Market news reporting, marketing.	(2)
Massachusetts:			
Boston	Market News Office, marketing, loans and grants.	Market news reporting, statistics, biological and technological research, marketing, fishery loans.	(2)
Gloucester	Field Office	Statistics, biological research, fishery products inspection, enforcement.	(2)
New Bedford	do	Statistics, biological research, market news reporting, enforcement.	(2)
Provincetown	Statistical Field Office	Statistics, market news reporting, enforcement.	(2)
Michigan:			
Hammond Bay	Field Research Station	Biological research	(2)
Ludington	do	do	(2)
Marquette	do	do	(2)
Minnesota, St. Paul	Marketing Office	Marketing	(2)
Mississippi, Ocean Springs.	Statistical Field Office	Statistics, market news reporting.	(2)
Missouri, St. Louis	Marketing and Inspection Offices.	Market development, fishery products inspection.	(2)

See footnotes at end of table.

G–2.—*Minor field research stations, market news offices, exploratory fishing stations, market development offices, and statistical offices, calendar year 1968*—Continued

Location	Type	Principal use	Gross valuation [1]
New Jersey, Toms River	Statistical Field Office	Statistics	[2]
New York:			
Bayport	do	do	[2]
New York City	Market News Office, Marketing, Fishery Products Inspection Office.	Market news reporting, marketing, fishery products inspection.	[2]
Ohio:			
Cleveland	Marketing and Inspection Office	Market development, fishery products inspection.	[2]
Sandusky	Field Research Station	Biological research	[2]
Oregon:			
Astoria	Enforcement and field research stations.	Enforcement of commercial fisheries laws and regulations and biological research.	[2]
Eugene	Field research station	River basin studies	[2]
Portland	do	Biological research	[2]
Rhode Island:			
Point Judith	Field Station	Statistics reporting	[2]
Warren	Statistical Field Office	do	[2]
South Carolina, Charleston.	do	do	[2]
Tennessee, Camden	Statistical Office	do	[2]
Texas:			
Aransas Pass	Market News and Statistical Field Office.	do	[2]
Brownsville	Statistical Field Office, Fishery Products Inspection Office.	Statistics, fishery products inspection.	[2]
Dallas	Marketing Office	Marketing	[2]
Freeport	Statistical Field Office	Statistics	[2]
Galveston	Market News and Statistics Field Offices.	Market news reporting, statistics.	[3]
Port Arthur	Statistical Field Office	Statistics	[2]
Virginia:			
Franklin City	Field Research Station	Biological research	[2]
Hampton	Market News Office	Market news reporting	[2]
Virginia Beach	Statistical Field Office	Statistics	[2]
Weems	do	do	[2]
Washington:			
Bellingham	Enforcement and inspection	Enforcement of commercial fisheries laws and regulations and inspection.	[2]
North Bonneville	Field Research Station	Biological research	14,000
Pasco	do	do	[2]
Seattle	Market News, Statistics, enforcement, loan and grants, marketing, Federal aid, and reports.	Market news and statistical reporting, fishery loans, marketing, Federal aid to States, and report publication.	[2]
Wisconsin, Ashland	Field Research Station	Biological research	[2]

[1] Figures shown are original acquisition or construction costs. Figures are not shown for the following:
[2] Installation not owned by Bureau of Commercial Fisheries. Includes property held under lease, cooperative agreements, and use permits.
[3] Installations at this location are both owned and leased by Bureau of Commerical Fisheries.
[4] Included in Pribilof Islands, appendix G–1.

G–3.—*Bureau of Commercial Fisheries vessel fleet, calendar year 1968*

Name of vessel	Home port	Length (feet)	Year built	Cost or estimated value	Main engine (horsepower)	Mission
Pribilof	Seattle, Wash	222	1953	$2,201,000	1,400	Transportation of supplies and personnel to the Pribilof Islands fur seal stations.
Miller Freeman	do	214	1967	3,371,000	2,150	High-seas salmon investigations and oceanography.
Albatross IV	Woods Hole, Mass.	187	1962	2,000,000	1,100	Fishery and biological research studies; oceanographic studies in Atlantic waters.
Geo. B. Kelez	Seattle, Wash	176	1944	927,000	1,000	High-seas salmon investigations and oceanography.
David Starr Jordan.	San Diego, Calif.	171	1965	2,000,000	900	Oceanography; sardine ecology, studies on biology of other commercial species.
Oregon II	Pascagoula, Miss.	170	1967	2,400,000	1,600	Exploratory fishing.
Townsend Cromwell.	Honolulu, Hawaii.	158	1963	1,800,000	800	Pacific oceanography; tuna biology, behavior, and distribution.
Delaware II	Gloucester, Mass.	156	1968	1,400,000	1,000	Exploratory fishing and biological studies on the groundfishes and sea scallops, gear research.
Undaunted	Miami, Fla	143	1944	1,000,000	1,850	Investigations of tropical Atlantic fishery.
Geronimo	Galveston, Tex	143	1944	1,000,000	1,850	Fishery oceanographic research.
Charles H. Gilbert.	Honolulu, Hawaii.	123	1952	400,000	500	Pacific oceanography; tuna biology, behavior, and distribution.
Oregon	St. Simons Island, Ga.	100	1950	300,000	600	Exploratory fishing for shrimp, tuna, and other potentially commercial species; gear research.
John N. Cobb	Seattle, Wash	93	1950	235,000	500	Exploratory fishing for pelagic and bottomfish, shrimp, and crabs; gear research.
Murre II	Juneau, Alaska	86	1943	64,000	115	Oceanographic studies in coastal waters of Southeastern Alaska with limited use for servicing shore facilities.
John R. Manning.	do	86	1950	180,000	320	Bottom surveys for halibut; patrol work; observations on foreign fishing activities in Bering Sea.
George M. Bowers.	Pascagoula, Miss.	73	1956	94,000	210	Gear research.
Kaho	Saugatuck, Mich.	65	1961	118,000	300	Exploratory fishing and gear research on industrial fishes, chubs, alewives, sheepshead, gizzard shad, and smelt.
Rorqual	Boothbay Harbor, Maine.	64	1941	187,000	230	Gear research and inshore exploration on herring and shellfish.
Miss Behavior	San Diego, Calif.	63	1943	120,000	760	Sonar and acoustical systems evaluation; gear research.
Cisco	Saugatuck, Mich.	60	1950	80,000	175	Research on deepwater fish species, their distribution, abundance, and ecology; limnology.
Heron	Juneau, Alaska	58	1940	19,000	135	Salmon and herring research.
Siscowet	Ashland, Wis.	57	1946	95,000	147	Research on deepwater fish species, their distribution, abundance, and ecology; limnology.
Shang Wheeler	Milford, Conn.	50	1951	46,000	140	Shellfish research; oyster and clam propagation; predator control.

G–3.—*Bureau of Commercial Fisheries vessel fleet, calendar year 1968*—Continued

Name of vessel	Home port	Length (feet)	Year built	Cost or estimated value	Main engine (horsepower)	Mission
Alosa	Oxford, Md	48	1941	6,500	82	Shellfish research; oyster propagation and disease studies.
Hiodon	Mobridge, S. Dak.	46	1965	24,000	190	Research on reservoir fish species.
Musky II	Sandusky, Ohio	45	1960	30,000	165	Studies on warmwater fishes of Lake Erie; limnology; pollution studies.
J–3486	Beaufort, N.C.	43	1942	28,000		Research on shellfish, striped bass, and other coastal species, collection of sample for radiobiological studies.
Kingfish	St. Petersburg Beach, Fla.	43	1954	25,000	150	Estuarine investigations.
Phalarope II	Boothbay Harbor, Maine.	40	1932	8,000	225	Clam and herring studies.
Sockeye	King Salmon, Alaska.	40	1946	11,000	175	Salmon research work.
Nancy	Beaufort, N.C.	40	1950	8,500	110	Research on shellfish, striped bass, and other coastal species, collection of sample for radiobiological studies.

Appendix H—Fish and Wildlife Service Publication Series and a 1968 List of Publications by Bureau Personnel

The regular, established series of the Fish and Wildlife Service in which BCF publications appear are:

Fishery Bulletin.—Technical reports on scientific investigations of fishery biology. The Bulletin of the United States Fish Commission was begun in 1881; it became the Bulletin of the Bureau of Fisheries in 1904 and the Fishery Bulletin of the Fish and Wildlife Service in 1941. Separates were issued as documents through volume 46; the last document was No. 1103. Beginning with volume 47 in 1931 and continuing through volume 62 in 1963, each separate appeared as a numbered Bulletin. A new system began in 1963: in volume 63 the articles are bound together in a single issue of the Bulletin instead of being issued only as individual papers. Twenty-nine papers (566 pp.) were published in 1968. Two papers (53 pp.) are in volume 66, No. 2, 10 papers (169 pp.) in volume 66, No. 3, nine papers (181 pp.) in volume 67, No. 1, and eight papers (163 pp.) in volume 67, No. 2. Bulletins are distributed free to libraries, research institutions, scientists, and State agencies. Some Bulletins are for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Fishery Industrial Research.—Technical reports dealing with scientific investigations of fishery technology, economics, exploratory fishing, and gear research. Twelve papers (134 pp.) were published in 1968. Three papers (36 pp.) are in volume 4, No. 2, three papers (23 pp.) in volume 4, No. 3, four papers (32 pp.) in volume 4, No. 4, and two papers (43 pp.) in volume 4, No. 5. They are distributed free to the fishing industry, libraries, scientists, and technologists.

Special Scientific Report—Fisheries.—Preliminary or progress reports and reports on scientific investigations of restricted scope. Established as Special Scientific Reports in 1940, Nos. 1 to 67 were issued from that date to 1949, when the new series, Special Scientific Report—Fisheries, with new serial numbering, was started. Eighteen of these reports (401 pp.) were published in 1968. They are distributed free to biologists, cooperators, and libraries. They also are distributed free on individual requests.

Fishery Leaflet.—Popular information on fishery subjects intended primarily for use in correspondence. Eleven leaflets (137 pp.) were published in 1968. They are distributed free to biologists, cooperators, and libraries. They also are distributed free on individual requests.

Circular.—Popular and semitechnical publications of general and regional interest intended to aid conservation and management. Twenty-six Circulars (884 pp.) were published in 1968. They are distributed free to biologists, cooperators, and libraries. They also are distributed free on individual requests.

Data Report.—Reports that include compilations of unanalyzed or partially analyzed data collected during biological, limnological, or oceanographic investigations. The reports were originally printed as 3- by 5-inch microfiche, each of which has up to 40 pages of material. In June 1965, BCF began using the 4- by 6-inch size of microfiche, which holds up to 70 pages. The pages are reduced to

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one-eighteenth normal size; consequently, they can be read only through a microscope, microfiche "reader," or any similar device for enlarging. The Data Report series is the first Government microfiche series to be used for primary publication of scientific reports. Advantages of microfiche over regular size reports are threefold. They occupy only about one-hundredth as much space; they can be printed in a matter of weeks rather than months; and for our distribution lists, the cost of printing and mailing is only about one-tenth as much. Data Reports 23, 24, 25, 26, 27, 28, 29, and 30 (866 pp., 15 microfiches) were issued in 1968. They are distributed free to a restricted mailing list of laboratories, libraries, State fishery agencies, research institutions, and research scientists. [Hard (full-size) copy is available for purchase at the U.S. Department of Commerce, Clearinghouse for Federal Scientific and Technical Information, Springfield, Va. 22151.]

Commercial Fisheries Abstracts.—A monthly abstract of world literature (chiefly English language) on fishery technology. Volume 21 in 1968 had 12 issues (348 pp.). They have free but limited distribution.

Commercial Fisheries Review.—A monthly periodical which features articles on BCF research and operations and trends and developments in the domestic and foreign fisheries. Volume 30 in 1968 had 12 issues (952 pp.). They are for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Subscription price is $6.50 a year, $2 additional for foreign mailing, single copies 60 cents each. Index for volume 29 (1967) of the Commercial Fisheries Review was issued also (46 pp.).

Statistical Digest.—Annual statistics with detailed tabulations relating to fishery production, manufacture, and commerce. These succeeded the Administrative Report series. One digest (681 pp.) was published in 1968. Digests are for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402; some are distributed free to a limited mailing list.

Current Fishery Statistics.—Current statistical information on fishery production, manufacture, and domestic or foreign trade; issued monthly, quarterly, or annually by States, regions or larger areas. In 1968, the Branch of Fishery Statistics issued 248 Current Fishery Statistical publications totaling 1,336 pages. In addition, considerable data were supplied to BCF's Branch of Market News for release in its Fishery Products Reports. The Current Fishery Statistical publications are sent to private and Government industries in the United States, foreign industries, and U.S. embassies.

Fishery Products Report.—Daily (5 times a week), monthly, and annual data on landings, receipts, supplies, prices, imports, and movements of fish and fish products in local areas; market conditions; and fishery developments in the United States and foreign countries. Special Market News reports showing statistical data and trends also are issued intermittently. Seven Market News Service field offices prepare and mail these free reports. During 1968, the 1,672 daily reports totaled 5,344 pages; the 34 monthly and 7 annual reports, 658 pages; and the 58 supplementary reports, 230 pages.

Current Economic Analysis.—Reports on prices, landings, production of processed products, imports, exports, and inventories. These reports deal with probable market conditions and price movements in the future and are designed to help industry personnel make decisions on short-run and intermediate production, distribution, and pricing. They also assist personnel in fishery-related industries and Government to plan and make decisions in their areas of interest or responsibility. In 1968, four issues of the Current Economic Analysis S8 to S11 (Shellfish Situation and Outlook) (156 pp.), two issues of the Current Economic

Analysis F3 and F4 (Food Fish Situation & Outlook) (157 pp.), and three issues of the Current Economic Analysis I1, I2, and I3 (Industrial Fishery Products Situation & Outlook) (125 pp.) were published. About 6,000 copies of the Shellfish Situation and Outlook and Food Fish Situation & Outlook are distributed in all 50 States and some 70 countries. About 2,000 copies of the Industrial Fishery Products Situation & Outlook are mailed to industry and Government personnel.

An "Index of Prices Received by Fishermen" is computed monthly. This is one of the few records available to give some idea of the economic wellbeing of commercial fishermen.

Fishery Market Development Series.—This series, established in 1966 to replace the Test Kitchen Series, contains popular educational publications on care, preparation, purchase, and nutrition of fishery products. These publications are for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. During 1968, three publications (74 pp.) were published.

Miscellaneous paper.—One miscellaneous paper, totaling 149 pages, was issued. It is the "Report of the Bureau of Commercial Fisheries for the calendar year 1966." BCF's annual reports are distributed free to biologists, cooperators, and libraries on individual requests.

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MS. #1994

U.S. GOVERNMENT PRINTING OFFICE : 1970 O—367-780