United States . Bureau of Commercial Fisheries,

UNITED STATES DEPARTMENT OF THE INTERIOR

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REPORT OF THE

BUREAU OF COMMERCIAL FISHERIES

FOR THE

CALENDAR YEAR 1965

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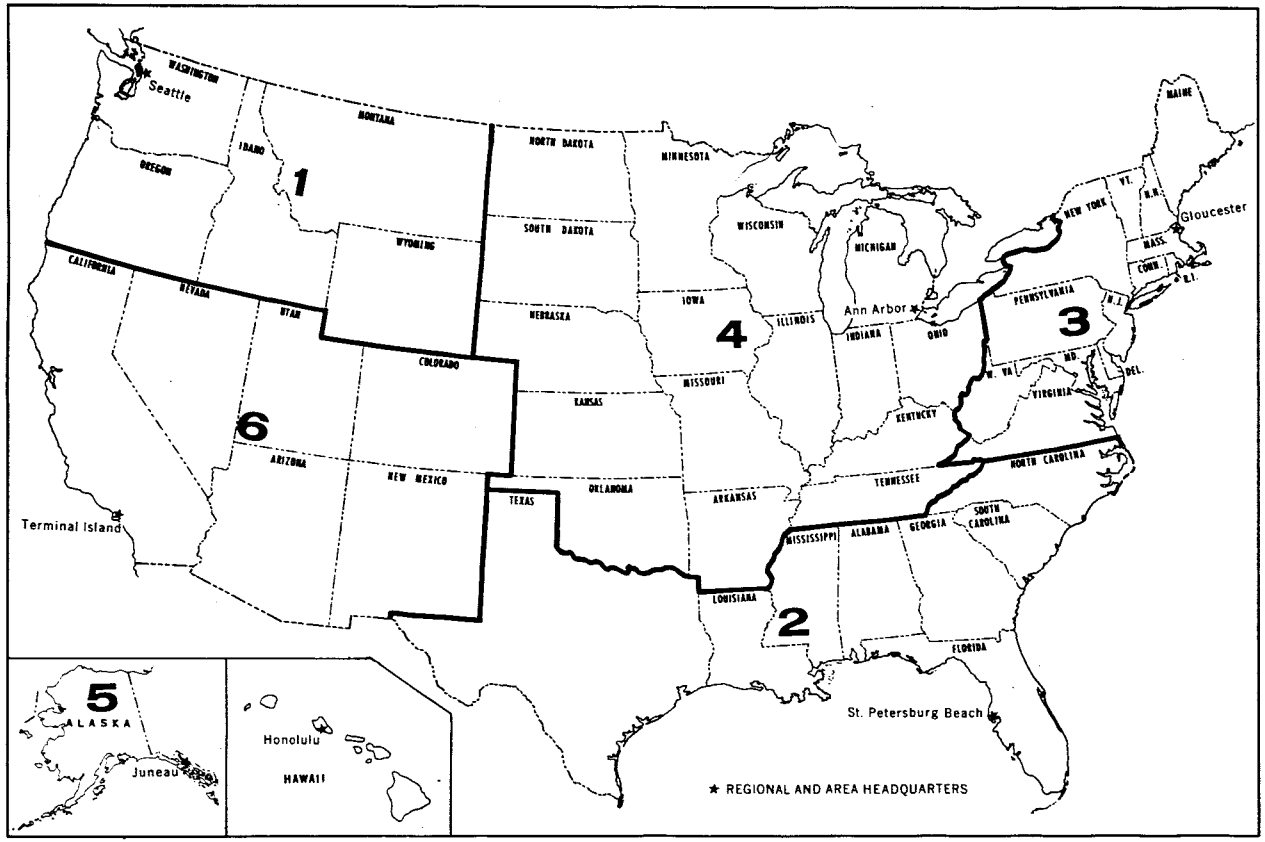

FRONTISPIECE.—Regional and area boundaries, Bureau of Commercial Fisheries, December 31, 1965.

Report of the Bureau of Commercial Fisheries for the Calendar Year 1965

This ninth annual report of the 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 Bureau of Commercial Fisheries and the Bureau of Sport Fisheries and Wildlife.

Information on projects undertaken in 1965 under the Saltonstall-Kennedy Act of July 1, 1954 is combined with other Bureau activities in this report. In the Bureau's annual report for calendar year 1964 a report on S-K activities was included as appendix H. Separate reports on S-K activities were issued for fiscal years 1955-63.

The fish and shellfish resources of the United States are outstanding assets that substantially increase the national income and food supply and provide employment for many people. These resources promote the health and well-being of the people.

These renewable resources will further enrich the United States if the fishing industry increases its volume of catches. The fishing industry must be free to seek new fishing grounds, fish on the high seas in accordance with international law, and develop methods, products, and markets in line with sound economic principles. Administrative or legal restrictions that conflict with or ignore economic conditions must be removed. The fishing industry needs also an economy in which it can improve its production and processing and be protected from subsidized competing products. Other needs of the fishing industry are services similar to those provided by the U.S. Government for other industries, such as fair trade standards, satisfactory industrial and labor relations, and improved health standards and sanitation. The

fishing industry needs services to provide current information on production and trade; market development and promotion; research services for economic and technological development and resource conservation; and resource management to ensure the largest sustainable yield for the fisheries.

The Bureau engaged in many activities in 1965 in its effort to fulfill the above needs of the fishing industry. These activities included investigations of the biology and ecology of commercially important inland, marine, and anadromous fishes, shellfish, and mammals. The purposes of these studies are to obtain information on causes of variations in abundance, develop methods for obtaining optimum sustained yields of fishery resources, and improve fish and shellfish culture. Bureau scientists advised various international and interstate fishery commissions in matters relating to biology and oceanography. They represented the Bureau and the Department of the Interior on interagency and international commissions.

The Bureau made many other investigations to help maintain the welfare of the fishing industry. Studies were made to improve and develop methods for catching, handling, processing, preserving, storing, transporting, and marketing fishery products. The composition, properties, and nutritive value of fishery products were determined. Improved methods of fish cookery were devised. Advisory and inspection services helped improve sanitation practices and plant operation. Exploratory fishing led to a determination of the character, extent, and availability of resources and tested, devised, and demonstrated the most effective types of gear and vessels.

The Bureau also made economic studies that benefited the industry. It investigated the assessment, development, and increased economic use of fishery resources; analyzed various economic aspects of production, distribution, and consumption of fishery products as required by various statutes; carried out the responsibilities that the Department of Interior has under the Fishery Cooperative Marketing Act of 1934; and worked on improving transportation facilities and rates for fish and shellfish and their products. It promoted the legitimate interests of the fishing industry in domestic and international economies to a degree commensurate with the Bureau's public responsibilities and furnished advice, reports, and consultation services to other Federal Government agencies, Congress, and the general public. It provided detailed information and recommendations relating to economic problems, and also developed Bureau-sponsored legis-

lation that was designed to resolve fundamental economic problems of the industry.

The fishery attaché and foreign fishery reporting program helped keep the industry informed about world trends.

To further promote and aid development of the fishing industry, the Bureau supervised a number of activities. It operated a fishery loan program, a fishing vessel mortgage and loan insurance program, and a fishing vessel construction differential subsidy program. It supervised the Columbia River fishery development, in cooperation with State agencies; coordinated and reported upon water resource developments that affect commercial fishing; and designed and inspected fish protective devices. It managed fur seals in the North Pacific and implemented laws and regulations relating to management of commercial fisheries, whales, and seals, pursuant to international agreement.

This report reviews briefly the Bureau's principal activities in 1965 to help the United States maintain its position as one of the world's leading fishing nations.

Condition and Trends of the Fisheries

The following data on the condition and trends of the fisheries are preliminary.

The U.S. supply of fish and shellfish in 1965 (imports and domestic catch) on a round-weight basis was 10.5 billion pounds —13 percent less than in 1964, but 1 percent greater than the previous 5-year average. Imports accounted for 55 percent, and domestic landings 45 percent of the total supply. For the first time one-half of our supply of edible fishery products was imported. The catch in foreign countries made up 59 percent of our 1965 supply of industrial products (fish meal, animal food, etc.).

U.S. fishermen landed 4.7 billion pounds of fish and shellfish with a value of $451 million at dockside (app. A). The value increased 16 percent over 1964 and was the highest in our history. The record value resulted from a larger catch of high-priced species and increased prices for most items. The volume taken in 1965 was 4 percent more than the previous year but 12 percent less than the record year of 1962. Compared with the previous year, significant gains were made in the catches of alewives, Pacific halibut, Atlantic sea herring, menhaden, tuna, surf clams, crabs, sea scallops, and shrimp. Declines occurred in landings of salmon, Pacific sea herring, jack mackerel, Pacific mackerel, Atlantic ocean perch, Pacific sardines, and whiting. Although

salmon landings were 25 million pounds less than in 1964, a shift in the species catch from the less expensive pink variety to the high-priced red salmon resulted in fishermen receiving $11 million more for their catch.

Menhaden, salmon, crabs, tuna, shrimp, and oysters accounted for 63 percent of the domestic catch and 61 percent of the value to fishermen. Menhaden (1.7 billion pounds), although down 27 percent from the peak year of 1962, was the species landed in greatest quantities. Record values were established in 1965 for shrimp, salmon, and crabs. Shrimp, worth $82 million to fishermen, was the most valuable item.

About 428 million pounds of the 1965 domestic catch were taken on the high seas off foreign coasts. This volume was made up of species, principally tuna, taken from Pacific waters off the coasts of Central and South America (61 percent); from the Atlantic Ocean off Canada (19 percent), mainly ocean perch; from the Pacific Ocean off Canada (11 percent), principally bottomfish (cod, flounders, lingcod, ocean perch, rockfishes, and sablefish); and from waters of the Gulf of Mexico and Caribbean Sea mainly off Mexico (9 percent), principally shrimp.

Louisiana led all States in landings with 794 million pounds, followed by Alaska with 484 million pounds and Virginia with 479 million pounds. Alaska was first in value with $72 million, followed by California with $52 million and Massachusetts with $46 million. San Pedro, Calif., again was the leading port in poundage and value, with landings of 331 million pounds and a value of $34 million. Other leading ports in volume of landings were: Pascagoula–Moss Point, Miss.; Reedville, Va.; Empire, La.; and Cameron, La. New Bedford, Mass., was in second place in value of landings, followed by Boston, Mass.

Substantial gains in the value of processed fishery products reflected the generally high ex-vessel prices to fishermen. The wholesale value of canned fishery products was $484 million, an increase of 11 percent from 1964 and 6 percent greater than the earlier record year of 1962. There were record canned packs of tuna and clam products and increases in the pack of Maine sardines, animal food, and shrimp. Producers of frozen fish sticks and fish portions and breaded shrimp established both volume and value records. Production of fresh and frozen fillets was relatively good in 1965. Groundfish fillet production from haddock, Atlantic ocean perch, cod, pollock, cusk, and hake was 77 million pounds, or slightly more than in 1964. Fillets produced from other species (91 million pounds) established a record. The

value of all industrial products (principally fish meal, oil, and solubles) was the highest since 1959.

The U.S. Bureau of Labor Statistics Wholesale Price Index for Fishery Products in December 1965 was 9.8 points above that of December 1964—fresh and frozen products were up 6.8 points and canned items were up 15.3 points.

U.S. imports of edible fishery products in 1965 were 1.4 billion pounds, or 76.7 million pounds greater than in the previous year. Imports of groundfish and ocean perch fillets had significant increases. Edible imports in 1965 consisted of fresh or frozen finfish items (principally salt-water fishery products), 67 percent; fresh or frozen shellfish (mostly shrimp), 17 percent; canned fishery products (mainly tuna and sardines), 11 percent; and cured products (dried, pickled, smoked, etc.), 5 percent. Nonedible imports declined because receipts of fish meal dropped. Imports of fish meal were 271,000 tons, down from 439,000 tons in 1964.

Exports of edible fishery products were 1.6 million pounds greater than the 94.8 million pounds in 1964. Shipments of canned squid and shrimp increased, but exports of canned mackerel and fresh or frozen fish decreased. Exports of nonedible fishery products declined because of reduced shipments of fish oils.

Per capita consumption of commercially caught fish in 1965 was 11.0 pounds—up 0.5 pound from the previous year, principally resulting from an increase in the consumption of canned products, which increased to 4.5 pounds from 4.1 pounds per capita in 1964. The Bureau has estimated that an additional 3 pounds per person were caught by sportsmen and others for home use.

Certain highlights of the 1965 fisheries were:

1. The total U.S. supply of edible fishery products (imported and domestic catch) was 5.1 billion pounds (live-weight basis), up 246 million pounds from the previous high in 1964. Record supplies were registered for fillets (including blocks) of groundfish and ocean perch—372 million pounds, canned tuna—409 million pounds, and shrimp—330 million pounds (heads-off weight).

2. U.S. fishermen received a record value for their catch—up $55 million from the $396 million in 1962, the previous high.

3. Record catches by domestic fishermen were made for Atlantic flounders, blue crabs, king crabs, and spiny lobsters.

4. Menhaden continued to lead the species catch accounting for 36 percent of the volume and 6 percent of the value of the total U.S. landings.

5. Shrimp, the most valuable item in the domestic catch, made up 5 percent of the volume and 18 percent of the value of the total domestic catch.

6. Bureau of Customs records revealed that 663 vessels (craft of 5 net tons and over) obtained documents as fishing vessels in 1965. Of this total, 428 were built in 1965, 33 in 1964, and 202 before 1964.

7. Production of canned tuna in the United States, processed from the domestic catch and fresh and frozen imports, was 7.8 million pounds above the 349.8 million pounds in 1964 — the previous record.

8. Production of canned clam products was a record, exceeding the 1964 pack of 60.3 million pounds by 7.2 million pounds.

9. Production of fish sticks and portions reached a peak of 222 million pounds, worth $91 million—up from the previous high in 1964.

10. Production of 97 million pounds of breaded shrimp exceeded the previous record established in 1964.

11. Imports of edible fishery products established a record. Receipts from foreign countries were at an all-time high in 1965 for groundfish and ocean perch fillets, fresh and frozen albacore tuna, sea scallops, spiny lobster tails, shrimp, and canned oysters.

12. Total exports of edible domestic fishery products were 96.4 million pounds, the highest since 1956. Shipments of canned squid (11.9 million pounds) and canned shrimp (4.5 million pounds) established records.

Developments in the Fisheries

Significant developments in the fisheries occurred in 1965 in the domestic field, in legislation, and in international affairs.

Domestic Fisheries

It is always encouraging to note that each year the U.S. fisheries generate new developments that show a dynamic improvement in some segments of the industry. In 1965, five developments that occurred from Alaska to the South Atlantic were particularly promising.

Farm Pond Fish Production

The fish farming industry in the Mississippi drainage area has grown rapidly during the last few years. The acreage used in fish farming in Arkansas was 33,790 acres in 1960 and 50,160 acres at the end of 1965. Channel catfish production is experiencing a pronounced increase in acreage annually. The 1965 acreage was slightly over 12,000 acres, distributed as follows: Arkansas 3,000; Mississippi 2,000; Louisiana 2,000; Texas 2,000; Missouri 1,250; and Kansas 800. Nearly all production outside Arkansas came into existence since 1963; much of this occurred in 1965. The 1965 crop of catfish was 15 million pounds worth $5 to $7 million at pondside.

To assist the fish farming industry, the Bureau has been developing a mechanical haul seining system to harvest pondfish. The resulting system materially reduces the manpower requirements in the harvesting operation. In recent trials, the haul seining method caught 26,000 and 33,400 pounds or 950 and 1,260 pounds per man-hour. This new harvesting method has made it possible to seine large ponds at a cost of .03 cent per pound—as compared with 1.5 to 3.0 cents a pound with the old seining system.

Fishing Fleet Trends in the Gulf of Mexico and South Atlantic

Five definite trends were noted in 1965 in the three most important fishing fleets of the Gulf and South Atlantic regions. First, the shrimp industry is turning to larger, more powerful steel vessels equipped to freeze and package the catch. These vessels have larger and more powerful winches, improved hull designs, and increased fuel and water capacities. Thus, these craft are more rugged, more seaworthy, and more able to stay at sea for longer periods. The ultimate goal is the capability for operating in the world ocean. Second, the menhaden industry is constructing large refrigerated vessels that can be used for purse seining menhaden or stern trawling bottomfish. The new ships will have an increased operating range and can be used year-round. Third, the increasingly larger and automated trawlers that catch industrial fish are making wider use of refrigeration. New vessels and many older vessels now are equipped to refrigerate the total catch. Fourth, improvements in vessel design and construction have led to craft that function as offshore oil supply vessels or as fishing vessels that can, after a minimum of modification, function as shrimpers, snapper trawlers or handliners, seiners, tuna longliners, or industrial fish trawlers. Fifth, recent

improvements on new vessels have been made to attract and hold higher caliber fishermen. Air-conditioned cabins, spacious living and mess accommodations, and improved safety and gear handling equipment make the fishermen's life more pleasant.

Great Lakes Alewife Fishery

An exploratory trawl fishing cruise for alewives was completed in Lake Michigan, with trawls being made off Ludington, Mich.; and Port Washington, Manitowoc, Sturgeon Bay, and Green Bay, Wis. Commercial quantities were caught in the Port Washington area. The cruise coincided with the sudden availability of alewives to trawl gear—research and commercial alike—in southern Lake Michigan. When the M/V *Kaho* first made good hauls of alewives off Port Washington, commercial trawlers reported heavy catches off Manitowoc and Milwaukee, Wis., and St. Joseph, Mich. At the same time, city water officials in Chicago, Ill., began having difficulty as the abundant alewives plugged the offshore water intake screens.

The Lake Michigan alewife population appears to be increasing. The 1964 commercial alewife production of about 10 million pounds was more than double that of 1963. Before 1956, alewives were not taken commercially. Landings in 1965 were over 15 million pounds, and a 50-percent increase in 1966 is not unlikely. Biologists have estimated that juvenile alewives in 1964 were nearly 50 times more abundant than in 1962.

Greater use of alewives would be beneficial. Their use in the developing fish meal and pet food industries will provide additional income to fishermen. When this species becomes overabundant, as it does occasionally, great numbers of fish die and the rotting carcasses are a nuisance, particularly in harbors. If large quantities of alewives could be harvested, the likelihood of such great natural mortalities would be minimized.

King Crab Fishery Expansion

Throughout 1965 the king crab fishery continued to expand. Total landings were estimated to be 30 percent more than the record 100 million pounds landed in 1964.

The vessels in the king crab fishery also continued to increase in number and size. Five years ago the fleet was a few small vessels 40 to 50 feet in length; now it is a growing fleet of highly efficient vessels that range in size to lengths over 180 feet. With a 4-man crew, a crab vessel fishes 80 to 90 traps (pots); each trap weighs 400 to 500 pounds. To increase efficiency, the vessels

have installed hydraulic powered blocks to haul the traps, radar and loran to locate buoys that mark the location of the gear, and larger holds to carry more crabs.

Pacific Hake Fishery Developments

The Bureau's chartered research vessel *St. Michael* completed over 3 months of study on how to harvest most effectively the Pacific hake off the North Pacific Coast. The study was designed to help encourage the beginning of a fishery for this underutilized species. Several commercial-scale modifications of the Bureau-designed experimental pelagic trawl were successfully tested off the Washington Coast from Cape Flattery to the Columbia River. Nets that were designed to be used by existing commercial vessels caught hake at about the same rate as the Bureau's larger experimental net. Catches of the commercial-type trawls ranged up to 45,000 pounds in a 90-minute drag.

At the expiration of her gear development charter with the Bureau, the *St. Michael* began fishing commercially for hake in Puget Sound, Wash. About 100 tons were caught in 13 tows. This was the first commercial fishing operation for hake in the North Pacific area. The catch was landed at a local company and processed into animal food and fish meal. This was the beginning of a new industry that will attract other fishing vessels and stimulate the construction of processing plants.

Federal Legislation

In 1965 the Congress passed six acts affecting the U.S. fishing industry (app. B). A summary of each act follows.

College Park Laboratory Facility

The Bureau's Technological Laboratory at College Park, Md., is on land given the Federal Government by the University of Maryland. At the time of donation many years ago the land was on the margin of the campus, but the University has so grown and changed that the Bureau Laboratory is now near the center of the University campus.

Bills were introduced in several sessions of Congress to authorize return of the land to the University, but none was passed until 1965 when Congress approved bill S. 1988 (Public Law 89-227), which authorizes and directs the Secretary of the Interior to convey the land and its improvements to the State

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of Maryland in return for payment by the State to the United States of the fair market value of the fixed improvements on the land.

Bureau activities on this land will not be interrupted because the University has agreed that the Bureau may continue its activities there for a reasonable time until it can acquire other land and build suitable facilities.

Facility for International Pacific Halibut Commission

To provide office space for the International Pacific Halibut Commission, Congress passed S. 1975, which was approved October 1, 1965, as Public Law 89–223. The Act authorizes the Secretary of State to provide the Commission, by contract, grant, or otherwise, facilities for office and other necessary space and an appropriation of not more than $500,000 for this purpose. The facilities are to be on or near the campus of the University of Washington at Seattle, Wash.

Except for a few years in the early 1930's when it was housed in the U.S. Bureau of Fisheries' new laboratory building on Montlake Blvd., Seattle, the Commission since 1925 occupied a University of Washington frame building that was constructed in 1917. The University wishes to replace the old building.

Fisheries Loan Fund

The basic authority for the fisheries loan fund, as contained in section 4 of the Fish and Wildlife Act of 1956, expired June 30, 1965, but was continued in force until June 30, 1970, by enactment of S. 998, which was approved July 24, 1965, as Public Law 89–85. In addition to extending the life of this program, the Act amends the earlier authority to permit loans for construction of new vessels which do not replace existing vessels. In such cases, however, the Secretary of the Interior must first determine that the applicant's contemplated operation of such vessel in a fishery will not cause economic hardship or injury to the efficient vessel operators already operating in that fishery.

A further amendment replaces the statutory 3 percent minimum interest rate with a formula for a minimum interest rate calculated by the Secretary of the Treasury taking into consideration the average market yield on outstanding Treasury obligations of comparable maturity and such additional charges, if any, toward covering other costs of the program as the Secretary of the Interior may determine. Application of this formula is not likely

to change the interest rate that has previously been in effect in this program.

National Anadromous Fish Program

As far back as the 87th Congress, consideration has been given to proposals to aid the States in a program to conserve, develop, and improve the anadromous fish resources of the United States. Such a program was authorized in the 1st Session of the 89th Congress by enactment of H.R. 23 as Public Law 89–304.

By this Act the Secretary of the Interior is authorized to enter into cooperative agreements with the States, acting jointly or severally, to conserve, develop, and improve U.S. anadromous fish resources that are subject to depletion from water resource developments or that are concerned with international conservation agreements made by the United States. Similar agreements are authorized to conserve, develop, and improve the resources of those Great Lakes fish that ascend streams to spawn. The Federal share of the cost shall not exceed 50 percent, and not more than $1 million of the funds appropriated in any 1 fiscal year shall be obligated in any one State. The Act authorizes an appropriation for the period ending June 30, 1970, of not more than $25 million to carry out the purposes of the Act.

Pesticide Research

The Act of August 1, 1958, as amended, directs the Secretary of the Interior to carry out comprehensive and continuing studies on how pesticides affect fish and wildlife resources of the United States. The original Act contained an authorization for an annual appropriation of $280,000. In 1959, this authorization was increased to $2,565,000. The President, in his message on Natural Beauty, recommended to the Congress that it remove the statutory ceiling on the appropriation authorization. The Congress, however, passed S. 1623, which increases the appropriation authorization to $3.2 million for fiscal year 1966 and to $5 million each for fiscal years 1967 and 1968. The President approved the bill as Public Law 89–232. If this program is to continue after fiscal year 1968, further action will be required by Congress to continue the appropriation authorization.

Protection of U.S. Fishing Vessels on the High Seas

In considering the Foreign Assistance Act of 1965, the Senate accepted an amendment that no assistance would be furnished any country which extended its jurisdiction for fishing purposes

beyond that recognized by the United States and which imposed any penalty or sanction against any U.S. fishing vessel fishing in such area. The Senate–House Conference, however, altered the language of that section to eliminate the absolute prohibition and substituted language which provides that in determining whether or not to furnish assistance under the Act, consideration shall be given to excluding any country which seizes, or imposes any penalty or sanction against any U.S. fishing vessel fishing in international waters. Both Houses accepted the revised language, and the bill (H.R. 7750) was approved as Public Law 89–171.

International Developments

Developments in foreign fisheries, like those in U.S. fisheries, greatly affect our fishing industry, policies, and programs. The drive of foreign countries for both high-seas fishery resources and world markets is a serious problem to our fishing industry. To help the industry solve this problem in 1965, the Bureau obtained information on foreign fisheries and assessed their effect on our fishing industry, policies, and programs. The Bureau also participated in international fishery meetings and helped enforce the treaties made at these meetings. The Bureau cooperated also in several international fishery programs. To place U.S. fishery products in foreign markets, the Bureau assisted in trade negotiations and sent representatives to trade fairs.

Developments in Foreign Fisheries

The world record catch of 56.9 million short tons was established in 1964 and continued the upward trend that began in the early 1950's. Complete data for the 1965 world catch are not available yet; however, it appears that for the 16th consecutive year world fishery production has increased and has set a new record. Increased fishery activities of Japan, Peru, and the U.S.S.R. during the past decade have contributed to the greater world catch. During this time, however, the U.S. catch has increased more slowly than the world catch. The United States, therefore, has dropped from second to fifth place among the leading fishing nations of the world. Ahead of the United States in volume of catches are Peru, Japan, Communist China (estimated), and the U.S.S.R.

Japan and the U.S.S.R., which are technologically advanced countries, catch fish and shellfish off U.S. coasts in the Northwest Atlantic and in the Bering Sea. They also are searching almost

every sector of the oceans for new fishing grounds. In addition to Japan and U.S.S.R., many new countries are increasing their fishery activities.

The United States and the U.S.S.R. signed an agreement February 5, 1965, at Washington, D.C., on fishing for king crab on the U.S. Continental Shelf in the North Pacific. The two countries agreed that, according to the provisions of the United Nations Convention on the Continental Shelf, the king crab is a resource of the Continental Shelf over which the coastal nation has sovereign rights for purposes of exploration and harvesting. Representatives of the two countries recognized the fact that for several years the U.S.S.R. has been fishing for king crabs on the United States Continental Shelf in the eastern Bering Sea and in other areas of the Northeastern Pacific. They took into account also that U.S. fishermen have only a small fishery for king crab in the eastern Bering Sea. Because of those factors, the United States agreed that U.S.S.R. fishermen may continue to fish in the eastern Bering Sea for 2 years at a reduced level of catch, but will not fish for king crab in other areas of the United States Continental Shelf.

The agreement also provides for conservation measures to be applied to crab fishermen of both countries in the eastern Bering Sea, for continued and intensified scientific study of the king crab resource there, and for enforcement of the terms of the agreement. The agreement specifies a substantial subarea in which only crab pots—the type of gear used by U.S. fishermen—will be used for commercial crab fishing. The two countries will hold further consultations before the end of the 2-year period.

International Meetings

The more important international meetings in 1965 were those of Food and Agriculture Organization of the United Nations, Great Lakes Fishery Commission, Inter-American Tropical Tuna Commission, International Biological Program, International Commission for the Northwest Atlantic Fisheries, International North Pacific Fisheries Commission, International Whaling Commission, and North Pacific Fur Seal Commission.

Reporting on Foreign Operations

The Bureau continued to obtain information on foreign achievements in fishery science and technology, including oceanography, and to assess the impact of foreign fishery activities on industry and Government programs and policies. The modernization and

increase in the fleets of foreign vessels resulted in greater competition for fish resources off U.S. coasts and elsewhere in the world oceans. Difficult problems of conservation and resource use arising at international conference tables required increased intelligence information on fishing activities of foreign countries to assist in reaching solutions compatible with U.S. interests. Data collected on the catches of U.S.S.R. fishing vessels off U.S. Pacific Northwest coasts were particularly useful in supporting the U.S. position for a reduction in U.S.S.R. fleet effort on hake and ocean perch resources there. Fishery attachés in Denmark, Ivory Coast, Japan, and Mexico continued to provide current reports on foreign fisheries as a basis for industry and U.S. Government decisions and policy-making. The attachés upheld U.S. positions, policies, and interests in formal and ad hoc international meetings and negotiations.

Trade

During 1965, the value of U.S. imports of fishery products was almost $601 million, a gain of 6 percent over the previous record year of 1964. The value of fishery exports was nearly $80 million, a gain of 8 percent. Exports in 1965 increased 49 percent in value over the previous 5-year average.

To increase U.S. fishery product exports, the Bureau established the Office of International Trade Promotion July 1, 1965, to develop new markets and expand sales.

The Bureau coordinated its efforts with those of the U.S. Department of Agriculture, the sponsor of international food trade fairs. These fairs benefit all participants. Foreign food distributors, retailers, wholesalers, and consumers become acquainted with new processed fishery products. Tradesmen learn of U.S. marketing methods and techniques from food executives who attend these fairs as official representatives. U.S. fish processors also profit because fairs provide them a showcase for their fishery products, experience in exporting, and opportunities to find trained foreign representatives to handle their products and to meet many food merchants and consumers.

The Bureau participated in two international food fairs in 1965 —one at Cologne, Germany, and the other at Brussels, Belgium. The Bureau furnished each exhibiting firm a free booth, frozen storage facilities, and display space for fishery products. A direct result of the Cologne fair was the sale of more than $300,000 worth of frozen salmon. Both fairs resulted in the exports of quantities of several other fishery products.

In 1965, Bureau officials also prepared papers for use at foreign trade meetings. Their first contribution was a summary of major U.S. imports of fishery products from Mexico for 1960–64 for use by the Department of State at the October 13 to 15, 1965, meeting of the U.S.–Mexico Economic Committee in Washington, D.C. Bureau officials also worked on the Country Committee's preparation for confrontation exercises on lists of exceptions in GATT (General Agreement on Tariffs and Trade) negotiations. Additional material was also prepared on fishery products for use in Kennedy Round negotiations. They also drafted material on "World Markets and Demands" for use at the April 30 to May 5, 1965, meeting in Washington, D.C., of the North American Fisheries Conference, sponsored by the fishing industry trade associations of Canada, Mexico, and the United States. Contributions were also made to the report, "Financial Support to Fishing Industry," of the OECD (Organization for Economic Cooperation and Development). A wide variety of questions on foreign trade from U.S. Congressmen, industry, and the general public also required attention of the Bureau.

Bureau officials reviewed and approved projects for AID (Agency for International Development) financing and investment surveys in Argentina, Brazil, Colombia, Nigeria, and Peru. They also reviewed and reported on several Special Fund fishery projects of the United Nations.

Treaty Enforcement and Foreign Fisheries Surveillance

The United States and the U.S.S.R. exchanged enforcement officers. Their enforcement officers participated in a reciprocal exchange May 11 to 29, 1965 in the area off the northeast U.S. coast. The principal reason for the exchange was to allow the enforcement officers of one nation to inspect the fishing vessels of the other to assure that both are observing the conservation measures recommended and adopted by the International Commission for the Northwest Atlantic Fisheries. United States enforcement officers boarded and inspected U.S.S.R. vessels, and U.S.S.R. enforcement officers did the same on United States vessels. United States enforcement officers gained considerable knowledge of U.S.S.R. fishing practices.

The United States and Canada made a similar exchange of enforcement officers in the Northwest Atlantic from May 12 to May 30.

The Bureau and the U.S. Coast Guard in 1965 cooperatively and separately fulfilled obligations imposed by international

fishery conventions. Patrolling the air and the sea, they enforced the regulations and kept foreign fishing under surveillance in Alaska, the Pacific Northwest, and New England. The Bureau helped the Coast Guard with the planning, provided qualified fishery management agents to accompany and assist all patrol craft, and made a limited sea patrol with a Bureau vessel.

Accomplishments and Operations

Principal Accomplishments

Some of the Bureau's more important accomplishments in 1965 are summarized below.

North Pacific

Accomplishments in the North Pacific region concerned collection of information on bottomfish stocks; evaluation of Columbia River anadromous fish programs; preservation and improvement of salmon and steelhead runs that originate in Columbia River; fishery explorations off the Washington Coast and in Southeastern Alaska; improved fishery product containers for the fishing industry; harvesting fur seals; estimating the number of fur seal pups; managing the fur seal resource; research and development in processing fur sealskins; collection of information on growth and migration of king crabs; oceanographic study of Lynn Canal–Chatham Strait; yield of Pacific hake stocks; salmon studies in Alaska, Columbia River area, and on the high seas; whale marking; and whale resource management and harvest.

Bottomfish stocks.—Bureau biologists at the Biological Laboratory in Auke Bay, Alaska, are studying the amount of halibut caught incidentally by Japanese trawlers and are also obtaining scientific information on the newly harvested bottomfish stocks. Four Bureau scientists aboard Japanese groundfish trawlers obtained data from fish taken in over 300 hauls in the Gulf of Alaska. These trawling fleets expanded their operations and continued to increase their catches of bottomfishes that U.S. fishermen do not now harvest in the northeast Pacific Ocean.

Columbia River Anadromous Fish Programs evaluated.—A preliminary economic evaluation of the Columbia River Anadromous Fish Programs was designed to give estimates of benefits and costs of maintaining anadromous fish runs in the Columbia River. Annual benefits accruing from sport and commercial fish-

eries for anadromous species were estimated and compared with the costs of annual operation and maintenance of the fish facilities that are operated by Federal, State, and private agencies. This evaluation indicated the average annual net economic value of the fisheries during 1962, 1963, and 1964 was about $8 million and average annual operation and maintenance costs of facilities needed to maintain the fisheries were slightly over $6 million. This evaluation indicates that net economic benefits attributable to the sport and commercial fisheries of the Columbia River for anadromous fishes exceeded costs of maintaining the fisheries by about $1.8 million annually during 1962, 1963, and 1964.

Columbia River Fishery Development Program.—In cooperation with the conservation agencies of the States of Washington, Oregon, and Idaho, the Columbia River Fishery Development Program began its 17th year of operations in 1965 to preserve and improve the salmon and steelhead runs that originate in the Columbia River. This Program provides for management investigations and for construction and operation of 21 hatcheries, 85 major fishways, 664 fish screens, several natural rearing lakes, and for spawning or incubation channels. About $26 million have been spent in construction; costs of operation and maintenance average about $2 million each year.

The 21 Program-operated hatcheries had a successful year in 1965. Releases of 65 million fall chinook, 3.6 million spring chinook, 35 million coho, 2.3 million steelhead, and 380,000 chum fry and fingerlings, totaled about 1,700,000 pounds. The following eggs were collected: 60 million coho, 56 million fall chinook, 3.8 million spring chinook, and 2.25 million steelhead. In 1965, the run of coho at Bonneville Dam was about 76,000—the highest since counting began in 1938—and exceeded the 1964 count by about 22,000. Most of these fish entered the hatcheries above the Dam.

In the evaluation study of the fall chinook salmon hatcheries, preliminary estimates placed the contribution of 1961 brood hatchery fish in the sport and commercial fisheries in 1963, 1964, and 1965 at about 2,581,000 pounds. Spring Creek National Hatchery, the most successful producer of fall chinook salmon, provided about 519,000 pounds of fish of the 1961 brood contribution to the sport and commercial fisheries. Kalama hatchery was next with a contribution of about 122,000 pounds.

Management technique studies continued to provide information for managing the fish resources. Of particular importance was the first return of selectively bred adult coho salmon that

were larger than adults from the natural stocks. Important also were the successful tests of a fish toxicant that kills predator squawfish but does not harm salmon or trout.

Water-use development on the Pacific Coast is causing problems. The Canadian storage projects, now being built, will alter significantly over the next 30 to 40 years the environment of the Columbia River. Freshet flows will be controlled, and surface spills over dams eliminated eventually. Downstream migrants must, therefore, pass primarily through turbines, which may be hazardous. The Dworshak Dam, now under construction on the North Fork of the Clearwater River in Idaho, increases the problems because it makes more difficult the management of the steelhead runs that use this River. Artificial propagation will be used to perpetuate the steelhead runs, and a large hatchery is being built near the Dam for this purpose.

Exploratory fishing and gear tests.—The vessel *Western Flyer,* which was chartered by the Bureau's Exploratory Fishing Base in Seattle, Wash., caught 892 tons of Pacific hake with a midwater trawl in 99 days off the Washington Coast. The largest single catch was 60,000 pounds in a 1-hour drag. The Bureau's M/V *John N. Cobb* also found hake concentrations west of the Strait of Juan de Fuca. Each ½-hour drag of a midwater trawl caught up to 20,000 pounds of hake.

Fishery explorations also were made in Southeastern Alaska by personnel at the Exploratory Fishing Base in Juneau, Alaska. During midsummer the Bureau's R/V *John R. Manning* located significant concentrations of bottomfish. Thirty-two trawling stations of about 1-hour duration were made in water depths of 192 to 828 feet. In shoal areas off Noyes Island, catches of 100 to 130 pounds of marketable rock sole were made in four drags. One drag took 1,600 pounds of commercial size Pacific cod. Rockfish made up the bulk of the catches in the deeper offshore areas. The largest catch, 23,500 pounds of rockfish, was made 35 miles southwest of Noyes Island in a water depth of 702 feet. This catch included 20,000 pounds of silver grey rockfish, 3,000 pounds of window rockfish, and 490 pounds of assorted fish. Good catches also were made in several areas suitable for commercial trawling.

Fishery product containers.—The wooden box that has been used for many years in transporting fishery products has increased in cost, decreased in quality, and lost much of its effectiveness in an age where transportation has improved radically. To find an improved distribution container for the fishing industry, Bureau marketing personnel in the Northwest contacted several

plastic companies, fishing firms, transportation companies, and airlines and asked them what features should be incorporated in a container to make it more useful for fishery products. These efforts led to the design and development of a plastic box that has many advantages over the older type wooden container. This box was produced first in the spring of 1965, and by the end of July over 2,000 of them had been sold or leased to two airlines based in Seattle. Several other major national and international airlines are now testing the boxes. Recently, Bureau marketing representatives have been working with three companies to develop light-weight plastic-coated or plastic-lined cartons that can be used for specialized short-haul or round-trip shipment of fresh fish. The development of suitable containers along with lower air freight rates for fresh seafood has opened a new horizon for the expansion of inland markets.

Fur seal harvest.—The commercially valuable sealskins taken from the Pribilof Islands in 1965 totaled 51,874 (42,070 males and 9,804 females). From St. Paul Island, 34,914 male and 6,902 female seals were taken, and from St. George Island 7,156 males and 2,902 females. Taking both males and females is a continuation of the program begun in 1956 to stabilize the size of the herds. Under terms of the Interim Convention on Conservation of North Pacific Fur Seals, the Governments of Canada and Japan each received 15 percent of the harvested skins.

In 1965, 38,067 sealskins were sold at spring and fall public auctions for the account of the U.S. Government. The gross amount received for these skins was $3,178,385.

Fur seal pup estimate.—Returns from marking experiments made by scientists of the Bureau's Marine Mammal Laboratory, Seattle, Wash., indicate that about 350,000 fur seal pups were born in 1965 on the Pribilof Islands. The number of pups born is now within the calculated range of maximum sustained yield. The program to reduce the number of breeding age females to bring the number of pups within this range is completed. An estimate of the required harvest of females is possible because males of a year class enter the kill a year earlier than females. When the kill from a year class of males does not exceed 45,000, females are not killed. Below this level all females from the year class are needed for breeding stock.

Fur seal resource management.—The Bureau continued to administer the fur seal industry of the Pribilof Islands and the Aleut communities of St. Paul and St. George.

Services comparable to those performed by an Executive Director were again supplied to the North Pacific Fur Seal Commission during the interval between the Eighth Annual Meeting held in Tokyo February 22 to 26, 1965, and the Ninth Annual Meeting to be held in Ottawa February 21 to 24, 1966.

Fur sealskin processing, research, and development.—The Department of the Interior awarded two sealskin contracts in 1965. The Department awarded a new contract April 30, 1965, to the Fouke Fur Company, Greenville, S.C., for processing, promoting, and selling Alaska sealskins. Under the contract terms, seven-eighths of the U.S. share of skins harvested at the Pribilof Island rookeries from 1963 to 1967 will be delivered to the Fouke Fur Company for processing and sale through semiannual fur seal auctions extending through the spring of 1970. The U.S. Government will use the remaining one-eighth of the skins in experimental processing and marketing contracts with other companies. The Department awarded the second contract August 30, 1965, to the Pierre Laclede Fur Company, St. Louis, Mo., for research and development in processing skins.

King crab research.—Major emphasis on king crab research in the Gulf of Alaska was shifted to the Shumagin Islands–Unimak Pass area. A large part of the U.S. catch comes from this area, where no research had been done before the recently increased fishing pressure. The highly successful joint tag recovery program by industry and Bureau scientists at the Biological Laboratory, Auke Bay, Alaska, probably results from the high interest of fishermen and processors. Nine king crabs tagged by the Bureau in the eastern Bering Sea in 1957–58 and recaptured by Japanese fishermen in 1965 produced new information on growth and migration. Data on crabs recaptured more than 6 years after tagging are scarce because of natural mortality and tag loss during molting periods.

The average size of male king crabs in the catch decreased during the intensive fishing by Japan and U.S.S.R. from 1953 to 1965. In terms of yield-per-recruit, the modal size group of recent catches is below that associated with optimum yield. Age-related estimates of natural mortality and growth refute the Japanese contention that the Bering Sea king crab stock was balanced and was fished during the 1950's with unimpaired productivity.

For the first time in a laboratory blue king crabs, *Paralithodes platypus*, were raised from the egg through four zoeal and one glaucothoe larval stages.

Lynn Canal–Chatham Strait study.—A 2-year oceanographic study of Lynn Canal–Chatham Strait was completed by Auke Bay biologists. Chatham Strait is a major portion of the Alaskan "Inside Passage" and has depths over 2,400 feet. In summer large amounts of fresh water drain into the estuary and form a low-salinity surface layer 33 to 66 feet thick. Below this layer the bulk of the water is undiluted sea water. The deep waters in the Chatham Strait basins are not stagnant because the normal dissolved oxygen levels were at least 20 percent of saturation.

Pacific hake studies.—On the basis of samples taken from California to Canada, scientists at the Bureau's Biological Laboratory in Seattle believe that Pacific hake grow rapidly until they mature at 4 years old and slowly thereafter. The sampling data also indicate an annual natural mortality of about 35 percent. Immature and mature hake evidently occupy different areas off Washington and Oregon. Exploratory fishing results suggest that an annual sustainable yield of 100,000 tons of hake can be taken from Pacific Northwest coastal waters.

Salmon investigations in Alaska.—New biological evidence obtained by Auke Bay scientists shows that when juvenile sockeye salmon spend an unusually long time in Karluk Lake they have a low fresh-water survival (about 0.33 percent), but the resulting older and larger smolts have extremely high marine survival (about 38.0 percent). These figures compare with fresh-water survival of about 0.90 percent for juvenile sockeye salmon at Brooks and Naknek Lakes, Bristol Bay, and a lower marine survival of about 18.0 percent for smaller and young smolts.

Research in Alaska has given valuable information on optimum escapements for pink salmon. Spawning densities of less than two females per square meter result in poor production as do densities of over three females per square meter. Fewer than 10 percent of Alaska streams normally receive as many as two females per square meter.

Salmon studies in the Columbia River area.—Studies by personnel of the Fish Passage Research Program of the Bureau's Biological Laboratory at Seattle, Wash., centered principally on how water resource developments affect salmon in the Columbia River Basin. These studies, carried out cooperatively with the State fishery agencies of Oregon, Washington, and Idaho, concentrated on passage of fish at dams, effect of impoundments on fish passage, collection of juvenile salmon in rivers and streams, adaptability of salmon to a changing environment, and better methods of marking young fish.

Studies on juvenile salmonids show that it may be feasible to bypass them around potentially dangerous turbines at dams. As a result of these studies, the Corps of Engineers has incorporated special design features that will provide for fish bypasses around turbines at dams now being built in the Snake and Columbia Rivers.

Experiments at the Bureau's fisheries–engineering research site at Bonneville Dam showed that adult salmon will swim through a 2–foot diameter pipe for distances up to 1 mile. This information will be useful when it is necessary to extend the exits of fishways to distant points that are upstream from dangerous spillway areas.

A newly developed device for collecting migratory juvenile salmon in rivers and streams above impassable impoundments or at other water–use projects is being tested at a large test flume in the Grande Ronde River at Troy, Oreg. The device incorporates an endless traveling screen that moves diagonally across a stream in the direction of flow and at a speed matching the water flow. Young salmon are diverted into bypasses where they may be collected and transported around danger areas.

The predicted environment of the Columbia River was discussed October 6, 1965, at a meeting of the Columbia Basin Interagency Committee. Bureau biologists stressed the danger of serious thermal pollution if water resource developments proceed on their present scale without adequate provisions for control of the water temperature.

A technique for thermal marking of juvenile salmonids was developed in 1965. An either mildly hot or extremely cold marking tool can be used to apply a letter, a number, or other symbol to the sides of fish as short as 2½ inches. No apparent harmful effects result. The mark has remained on the fish for as long as 1½ years and has been used extensively to identify specific groups of fingerling salmonids passing downstream in the Columbia Basin. Recaptures of these marked fish at various dams in the Basin provided information on timing and migration rates in relation to prevailing river flows.

Salmon studies on the high seas.—Scientists at the Bureau's Biological Laboratory in Seattle, Wash., found that about one–quarter of the mature sockeye caught in the meshes of high–seas gill nets fell out of the nets before they were hauled. The relative dropout rates of sockeyes caught in gill nets on the high seas and along the coast are important in assessing effects of Japanese fishing on North American stocks.

These scientists in Seattle also found scale characters useful for distinguishing Asian from Bristol Bay sockeye, and for identifying stocks intermingled in the Gulf of Alaska originating from Chignik River to Nass River, Smith and Rivers Inlets, Skeena and Fraser Rivers, and the Columbia River. Pink salmon also were identified as to area of origin by scales. Sockeye salmon from the Kamchatka River, U.S.S.R., were hatched from eyed eggs at the Leavenworth, Wash., hatchery to compare their patterns of scale and body growth with those of North American stocks at different ages.

In the western North Pacific during February near lat. 46° N., the Bureau's M/V *George B. Kelez* made good catches of sockeye salmon that had migrated from North American or Asian streams since the previous June. During autumn, chum salmon replaced sockeye as the predominant species between lats. 47° N. and 49° N.; salmon were absent south of about lat. 46° N.

Whale marking.—In 1965, 207 whales of six species were marked off California and Baja California. Three fin whales marked in 1962 were recovered, one off California by a U.S. whaler, and one each by Japanese and U.S.S.R. whalers in the Gulf of Alaska. Bureau scientists from the Marine Mammal Laboratory in Seattle, Wash., made biological examinations of 63 percent of the whales brought to California whaling stations.

Whale resource management and harvest.—Whale catching and land-processing operations of five companies in Oregon and California were licensed and inspected. These companies caught 243 whales and sold their meat primarily to fur animal ranchers.

California

The principal accomplishments in California concerned the anchovy fishery; balloons for spotting tuna; costs and earnings of tuna seiners; educational programs for fish cookery and handling; oceanographic data collection; and thermocline and tuna seining.

Anchovy fishery.—Results of the egg and larva surveys of the California Cooperative Oceanic Fisheries Investigations (in which the Bureau participates) showed that the abundance of anchovies had increased. The California Fish and Game Commission, therefore, on November 12, 1965, legalized the taking of anchovy for reduction into meal and oil. This is an experimental fishery initially limited to 75,000 tons a year. With the beginning of the new anchovy fishery, the Bureau's California Current Resources Laboratory at La Jolla shifted its research emphasis from

the sardine to the anchovy and the hake, both of which have a tremendous commercial potential in the eastern Pacific.

Balloons for spotting purposes.—A study is in progress by the Bureau's Tuna Resources Laboratory at La Jolla to test the use of lighter-than-air vehicles for spotting fish in commercial fishing and marine research. The Laboratory is seeking an inexpensive substitute for airplanes, something that can operate from fishing and research vessels and be independent of shore-base facilities. Although balloons have not been designed and built for both operating at sea and towing in windy conditions, tests with a hot-air balloon indicate that the operation of ship-based balloons is feasible if a balloon is designed specifically for this purpose.

Costs and earnings of tuna seiners.—Changes in the efficiency and composition of the California-based tuna fleet and the trend toward larger tuna purse seiners pointed up the need for a detailed study of costs and earnings. The Tuna Resources Laboratory in 1965 completed such a study, which provided a method to estimate earnings of both owners and crew of various size purse seiners under any prevailing catch rate and price structure for yellowfin and skipjack tuna. Under recent catch rates and prices the optimum size tuna purse seiner appears to be one with a capacity of 350 to 500 tons.

Fish cookery and handling.—Marketing personnel of the California Region are regularly providing educational programs for advanced students in the Navy food service school in San Diego. The students, usually a group of 35 to 40 members of a Navy food service team, are career-commissarymen who either supervise messes for thousands of sailors or will instruct other commissarymen throughout the Navy. Typically, a program is presented by a home economist and a fishery marketing specialist who divide each class into groups to prepare one of several recipes. A testing session for prepared products and a lecture on handling, care, and menu planning provide the students with a good introduction to cooking for large numbers of people. As a result of these classes on fish cookery and handling, the Navy has reported a significant increase in use of fish products. The programs for the Navy have been valuable. Naval retirees frequently take important posts in civilian food service establishments. For example, food services at the Terminal Island Federal Prison, the California School for the Deaf, and a cafeteria chain in the San Francisco area are operated by ex-Navy commissarymen. Recently, the program has been expanded to include commissarymen from the Marines' Camp Pendelton and the Air Force's March Base.

Oceanographic data collection.—Large-scale fluctuations in physical properties of the ocean significantly affect abundance and availability of commercial fishes. Because of this, the Bureau's Biological Laboratory at Stanford began a pilot project to test the feasibility of collecting subsurface temperature data from ships of opportunity. Through cooperation of Matson Navigation Co., a newly developed expendable bathythermograph system was placed aboard the *SS Californian* in November 1965. The ship's personnel who operated the system obtained temperature data down to 1,500 feet at about biweekly intervals between Honolulu and San Francisco.

In addition, an automatic data processing project is in process to prepare monthly charts of sea surface temperature in the Pacific from observations taken by merchant and U.S. Navy ships during 1949–62. Through cooperation of the Fleet Numerical Weather Facility, a computer program for analyzing and plotting randomly spaced scalar data was adapted to handle data that had been edited and stored on magnetic tape. After a final editing, the charts will be prepared for publication as a historical series.

Synoptic oceanography for fisheries.—The cooperative Bureau–Naval Weather Service synoptic oceanographic data exchange program was conceived and implemented during 1965. In exchange for synoptic ocean thermal structure (BATHY) data received by the Tuna Resources Laboratory and forwarded to Fleet Numerical Weather Facility, Monterey, Calif., the Naval Weather Service is making available its portfolio of unclassified weather and oceanographic information and forecasts to research and commercial fishing communities. Data forwarded to Monterey are processed by computer and returned to the Laboratory. These analyzed products are plotted by special on-line display plotters and collated and incorporated wherever useful in the Bureau's Daily Fishing Information advisory broadcasts to the albacore and bluefin tuna fleet.

Thermocline and tuna seining.—A study begun in 1963 by the Tuna Resources Laboratory has shown that purse seining for tuna is most successful when the upper mixed layer of the ocean is shallow and there is a sharp temperature gradient in the thermocline that together apparently cause tuna to remain nearer the surface within reach of purse seine nets. Despite incomplete understanding on how the thermocline affects tuna, measurements of the depth of the mixed layer and of temperature gradients will help fishermen identify areas where they may be more successful and in designing the strategy they use in setting the nets.

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Hawaii

In the Hawaiian area the principal accomplishments concerned oceanographic and tuna studies.

Hawaiian oceanography.—The Bureau's Laboratory at Honolulu completed an 18-month time-sequence study of the oceanography of the Hawaiian Islands area. This forerunner investigation provided vital basic data for a much larger survey of the entire trade wind zone, Project Porpoise, which is scheduled to begin in July 1967.

Tuna studies.—After drawing together information gathered by students of population dynamics, genetics, oceanography, tuna biology, behavior, and statistics, the Bureau's Biological Laboratory at Honolulu formulated a conceptual model that synthesizes all past and present knowledge of the skipjack tuna of the eastern half of the Pacific Ocean. One implication of the model is that the central Pacific has substantial quantities of skipjack that are not fished. Surface-swimming schools, however, are sighted only rarely away from islands and continents.

Part of the model was based on results of investigations on the genetics of skipjack tuna; however, the information then at hand was only fragmentary. Geneticists at the Laboratory subsequently discovered in 1965 the Y blood group system, a powerful new tool for delineating different subpopulations of skipjack tuna. Biologists using this system already have distinguished three subpopulations in Hawaii, and they now are applying it to skipjack tuna samples from other parts of the Pacific.

The first direct observation of skipjack tuna below the surface layer of the ocean was made in 1965 in Hawaii when Bureau scientists aboard the two-man submarine *Asherah* saw skipjack feeding on smaller fishes down to a depth of 500 feet. This finding has important implications for developing a fishery for subsurface skipjack.

Gulf of Mexico

In the extremely important Gulf of Mexico area the Bureau made significant progress in studying the valuable inshore bottoms, in promoting the sale of underutilized fishes, in investigating pesticides in shellfish, and in performing research on abundance of shrimp.

Bottom investigations.—The Bureau's Biological Laboratory at St. Petersburg Beach, Fla., in Tampa Bay estuary has found that natural, inshore bottoms typically are firm with sand and shell and support over 500 species of animals and plants. Areas

altered by pollution and bayfills have an impoverished and unbalanced bottom fauna and flora especially where sediments of clay and silt predominate. Each estuarine acre has an estimated value of $600 a year based on fisheries, recreation, and importance to commerce, industry, and utilities.

Surveys of the bottom also uncovered large numbers of the southern hard clam (quahog) near barrier islands adjacent to the Gulf of Mexico. Although some beds support a population of as many as nine clams per square foot, no commercial fishery for them exists because of wide fluctuations in abundance from year to year, probably caused by predators. Studies showed the southern hard clam grows about 1 inch a year until it becomes 3 inches long; after that it grows more slowly. These southern quahogs, which grow twice as fast as northern quahogs, may be grown to marketable size in less than 2 years.

Market development for underutilized species.—A special effort during 1965 to develop markets for underutilized species has shown that cooperative efforts between fishery trade associations, State agencies, and the Federal Government are effective. Marketing representatives of the Bureau first introduced mullet loins[1] into the Florida division of a large restaurant chain during 1965. Sales have rapidly increased, and now mullet loins account for 3 percent of dollar sales in these restaurants. Ten Florida restaurants in this chain alone are using thousands of pounds of this product. Bureau representatives also have introduced mullet loins to the Florida school lunch system, chainstores, and other restaurant chains. This product has been favorably accepted wherever it has been introduced. Close liaison with State officials of Florida and with industry producers and processors, combined with a concentrated marketing effort, has resulted in a high-quality mullet product and the consequent expansion of the mullet industry.

Cooperative efforts to find uses for underutilized Gulf fishes have led to the establishment in Miami of a new canning plant that will process mullet, kingfish, and bonito.

Pesticide pollution in estuarine shellfish.—The Bureau's Biological Laboratory at Gulf Breeze, Fla., has established a nationwide monitoring system to identify pesticide pollution by using estuarine shellfish as indicators. This Laboratory, 14 State conservation agencies, university laboratories, and other Bureau laboratories have cooperatively established 150 stations in coastal

[1] A loin is the dorsal half of a fillet.

estuaries. Pollution by any of 11 organochlorine pesticides is identified by monthly analyses of samples from populations of clams, mussels, or oysters. The Laboratory has developed a technique that enables cooperating agencies to preprocess samples so they can be mailed to the Laboratory without refrigeration for chromatographic analysis. Persistent low levels of pesticide pollution are apparent in most estuaries at all seasons. Use of such information is expected to help identify sources of pollution and determine if decreases in estuarine productivity are related to pesticides.

Shrimp studies.—By determining the earlier densities of postlarval and juvenile brown shrimp in estuarine nursery areas, the Bureau's Biological Laboratory at Galveston, Tex., has been successful in predicting brown shrimp abundance on offshore trawling grounds and has expanded its sampling program. Collections of postlarval shrimp are obtained routinely from four areas on the Texas Coast, and information on juvenile shrimp is collected from bay systems. These samples will improve the accuracy of the Laboratory's forecasts of shrimp abundance to the fishing industry.

The Laboratory has had considerable success in 1965 in developing techniques for rearing shrimp from eggs of the several commercially valuable species spawned in the Laboratory. These studies have required extensive experiments to develop methods for raising and maintaining cultures of single and multicelled diatoms, dinoflagellates, and other food organisms for rapidly developing larval shrimp. The Laboratory learned also that water quality influences the survival of larval shrimp. Because of these achievements, the Laboratory has grown large quantities of shrimp larvae for experiments and for stocking salt-water ponds.

A recently completed phase of the Laboratory's study on environmental requirements of larval shrimp shows that dredged and bulkheaded larval shrimp nursery areas produce 70 percent fewer shrimp than do undisturbed areas.

Atlantic Coast

The activities of the Bureau on the Atlantic Coast were numerous. The Bureau completed a report on biology and management of American shad; processed over 2 million sea surface temperature observations; investigated the socioeconomic characteristics of the Boston large-trawler labor force; and in cooperation with the U.S. Coast Guard placed temperature and temperature-pressure recorders on the bottom off Cape Cod Light, Mass. The

Bureau also accelerated its fish protein concentrate program, took a major step toward using atomic energy to preserve seafoods, enlarged its surveys of estuaries to determine abundance of juvenile menhaden; in coordination with the International Commission for the Northwest Atlantic Fisheries continued to survey groundfish resources of New England; furnished data from its toxicological studies to a corporation for obtaining U.S. Department of Agriculture registration of a chlorinated hydrocarbon; taught its shellfish rearing methods to commercial shellfish producers; advanced its studies on shellfish mortality in Chesapeake Bay; located brown shrimp on the middle and outer Continental Shelf area south of Cape Kennedy, Fla.; and caught commercial quantities of surf clams off Maryland, Virginia, and Delaware and moderate numbers of swordfish off the east coast of Florida. Details of these activities follow.

American shad.—The Bureau's Biological Laboratory at Beaufort, N.C., completed a manuscript on the biology and management of American shad. The report has data on all major barriers to anadromous fishes in 24 rivers along the Atlantic Coast.

Atlas for the tropical Atlantic.—Using an automatic data processing program, the Bureau's Tropical Atlantic Biological Laboratory at Miami, Fla., processed about 2.8 million sea surface temperature observations on file in the U.S. Weather Bureau's National Weather Records Center. These data provide a base for an atlas of the mean monthly sea surface temperatures and their zonal variations in the tropical Atlantic.

Boston large-trawler labor force study.—The Bureau's Division of Economics investigated the socioeconomic characteristics of the Boston large-trawler labor force and evaluated how these characteristics may tend to constrain the Boston fishing industry in the future. The study of 1964 data revealed that fishermen on the Boston offshore trawlers have a median age of about 57 years and an educational level that is low compared with the total U.S. labor force. Average earnings of the Boston fishermen also lag well behind those paid by other industries. The job absence rate in this industry is high: annual loss of time due to illness, injury, and unemployment averaged more than 6 weeks per man in this labor force. The study emphasized that industry must plan to replace this aging labor force. Working conditions and earnings must be improved to attract recruits who can profit from programs of training in the skills needed aboard fishing vessels.

Environmental studies.—The Bureau's Environmental Oceanographic Research Program, Washington, D.C., continued the

Cape Cod Field Study Project. Through cooperation of the U.S. Coast Guard, temperature and temperature–pressure recorders were put on the bottom off Cape Cod Light, Mass., at five locations ranging from 36 to 174 feet deep. These recorders are recessed in the concrete mooring blocks of navigation type buoys and have provided continuous data for research on environmental tolerances of sedentary bottom animals. Sampling with dredges every 6 weeks along the stations has provided biological data for correlation with temperature data. A secondary purpose of the Project is to develop a reliable method for establishing recording instruments on the fishing grounds of the Continental Shelf.

FPC (Fish Protein Concentrate).—The FPC research program accelerated and progressed significantly in 1965. A model unit for processing FPC by solvent extraction was constructed and put into operation at the Bureau's Technological Laboratory, College Park, Md. The unit, capable of producing 100 pounds of finished product per day, provided FPC for chemical tests, feeding studies, and economic feasibility determinations. The concentrate produced in this unit can be readily incorporated into foods on a reasonably large scale and then tested to determine its acceptability as a part of the human diet. Data on FPC produced in the model unit have been collected, compiled, and are to be used as a basis for a petition seeking FDA (Food and Drug Administration) approval for the domestic marketing of FPC made from whole fish.

All FPC produced in the Laboratory and in the model unit is being analyzed for protein, lipids, moisture and ash, available lysine, and other tests that determine the nutritive value of the product.

A large portion of the FPC research program is being carried out by contract with private and academic research organizations. These contracts complement and extend the processing studies at the Bureau's Laboratory in College Park and include research on the chemistry of flavor reversion in FPC, lipid composition and changes in FPC during storage, use of FPC in various food products, survey of solvents, toxicological studies, and wholesomeness of FPC.

The production of a satisfactory FPC affords an opportunity to develop markets for the great supplies of fish that remain unharvested off our coasts. These unused resources can yield about 5 billion pounds of fish per year, which would double the present U.S. catch. Harvesting these resources could both provide additional employment for our fishermen and help decrease

the protein malnutrition that adversely affects about two-thirds of the world's people.

Irradiation of fishery products.—The food preservation industry is approaching a new era in which energy from radioisotopes will be used to destroy the bacteria that cause food spoilage. Research by the Bureau under contract with AEC (Atomic Energy Commission) has shown that many fish products can be preserved by irradiation. The shelf life (the storage time before the product becomes unpalatable) of haddock, ocean perch, clams, shrimp, king crab, and flounder, for example, is tripled when these seafoods are irradiated at levels from 100,000 to 450,000 rads (measurable absorbed energy) and stored at 33° F.

A major step toward using atomic energy to preserve seafoods on a commercial scale occurred in 1964, when the MPDI (Marine Products Development Irradiator) was dedicated at Gloucester, Mass. This unit, operated by scientists at the Bureau's Technological Laboratory at Gloucester, can process up to 1 ton of fish per hour at a dose level of 250,000 rads. Large quantities of fish can be processed to enable the Bureau to learn how commercial handling methods affect the quality of irradiated fishery products, what consumers think of these products, and what are the economics of the irradiation process.

The success of this research program thus far has prompted AEC to submit to FDA (Food and Drug Administration) a petition to permit the commercial use of radiation-pasteurized cod, haddock, pollock, flounder, and sole.

Menhaden studies.—The Bureau's Biological Laboratory at Beaufort, N.C., extensively enlarged its surveys of estuaries to determine the abundance of juvenile menhaden on the Atlantic Coast. These surveys found an extremely poor 1965 year class. The Laboratory made studies also on menhaden larvae to determine how low temperature affects their survival. The studies suggest that larvae entering estuaries probably survive if the water temperature does not drop below 39° F. and the salinity remains between 10 and 20 parts per thousand.

Oceanic research.—In coordination with the International Commission for the Northwest Atlantic Fisheries, the Bureau's Biological Laboratory at Woods Hole, Mass., continued to survey the groundfish resources of the New England area to assess the effect of fishing on the major species. The biological work on these groundfish included the study of relative abundance, stock differentiation, age determination, growth rates, mortality, and estimations of yield per recruit and maximum sustainable yields.

Calculations show the Northwest Atlantic is being fished at or beyond the level of maximum sustainable yield; therefore, stringent management measures are needed critically. Mesh regulation alone is insufficient. Fishing effort must be limited if the abundance of fish stocks is to be maintained at a satisfactory level for maximum production.

Experiments on selectivity of trawl nets for silver hake and red hake in the Northwest Atlantic were made on research and commercial fishing vessels. The purpose was to determine what mesh sizes should be used to catch hake in the event mesh size regulations should become necessary.

An ecological bench mark of the distribution and abundance of groundfish on New England banks was completed. It is based on 3 years of intensive surveys with Bureau vessels. Results of these surveys will form the base line for all future research and surveys on the groundfish of the Georges Bank/Gulf of Maine area.

The Bureau's vessel *Albatross IV* completed 2 years of surveys off New England. A base has been established again for evaluating future conditions in an area of complex currents and extreme seasonal changes and for assessing the possible effect of environmental conditions on fish populations.

The Bureau's Laboratory at Woods Hole completed sorting the bottom-dwelling organisms found in extensive collections made on the Atlantic Continental Shelf in cooperation with the Woods Hole Oceanographic Institution and the U.S. Geological Survey. Knowing the distribution and abundance of these organisms is essential to understanding the biology of the groundfish that depend upon them for food. In connection with this program, an underwater camera was developed and used successfully in an initial test to estimate the abundance of bottom-dwelling forms. The camera promises to be useful also in quantitative studies of bottomfishes.

Oyster drill control.—Data from the Bureau's Biological Laboratory at Milford, Conn., and from contract toxicological studies were used by the Hooker Chemical Corporation to obtain U.S. Department of Agriculture registration for "Polystream," [2] a chlorinated hydrocarbon, for use in Connecticut and New York waters to control oyster drills *Urosalpinx* and *Eupleura*. This registration permits oyster farmers in these States to use "Polystream" for predator control subject to State management regulations. For other areas of the country, use of the method is still

[2] Trade names referred to in this publication do not imply endorsement of commercial products.

subject to Experimental Permit status, which means that State research organizations must evaluate the chemical under local conditions.

Seed oyster production.—To increase their seed oyster production, operators of commercial oyster hatcheries on Long Island are adopting the shellfish rearing methods that the Bureau's Laboratory at Milford developed to alleviate the shortage of natural setting of shellfish. Some California and Oregon commercial shellfish producers also have studied rearing methods at the Laboratory because they intend to produce European and Japanese oysters and abalones in hatcheries on the West Coast. Seed produced in a hatchery costs about the same as seed from natural set collected from a salt pond in which raft culture techniques were used.

Shellfish mortality.—Studies of shellfish mortality at the Bureau's Biological Laboratory at Oxford, Md., have led to a greater understanding of the prevalence and distribution of parasites in Chesapeake Bay. Several unrecognized microparasites and life cycle stages have been observed in shellfish from samples taken from Chesapeake and Chincoteague Bays. A major breakthrough was made in understanding the life history of *Minchinia nelsoni* (earlier known simply as MSX) when prespore and spore stages were found in Chesapeake Bay oysters. This protozoan parasite has destroyed many Chesapeake Bay and Delaware Bay oysters in recent years. Cooperative studies of mortality and disease with other Bureau laboratories and State management agencies were begun in 1965, and significant information was gathered on the prevalence of microparasites and epizootics in various localities other than Chesapeake and Delaware Bays.

Shrimp resource.—The Bureau's vessel *Oregon,* operating from the Bureau's Exploratory Fishing Station at St. Simons Island, Ga., found a concentration of brown shrimp on the middle and outer Continental Shelf area south of Cape Kennedy, Fla. Each 1-hour drag of a 40-foot trawl caught 15 to 25 pounds (heads-on). After news of this discovery had been radioed to the nearby commercial fleet, as many as 70 shrimp vessels began trawling in the area. Their catch rates were reported as high as five to six 100-pound boxes of 14-count brown shrimp (heads-on) in each night of trawling.

Surf clam survey.—Continuing the Bureau-industry surf clam surveys of 1963 and 1964, which are supervised by the Bureau's Exploratory Fishing Base at Gloucester, Mass., the Bureau's vessel *Delaware* caught commercial quantities of surf clams in sev-

eral areas off the coasts of Maryland, Virginia, and Delaware. Of the 1,135 clam dredge hauls made by the *Delaware* in the spring and summer of 1965, 70 drags took 1 to 8.9 bushels of clams in each 4-minute drag. These commercial quantities were taken on hard, sandy bottoms in water depths of 102 to 114 feet off Cape Charles, Va., and Cape Henlopen, Del. Most of the clams taken in the survey were 5 inches or longer.

Swordfish and tuna explorations.—The Bureau's vessel *Oregon* caught moderate numbers of swordfish off the east coast of Florida. The best catches were east of St. Augustine, where six fish were taken on a 500-hook night set. These catches disprove the belief that swordfish are not in this area in summer.

Small catches of bigeye, blackfin, and yellowfin tunas were also taken during night longline sets and daylight trolling.

Great Lakes

The Bureau made gratifying progress in the Great Lakes region. It found a rapidly expanded alewife population in Lake Michigan; developed audiovisual marketing aids of slide presentations, film strips, and video tapes; and found the first strong year classes of Lake Erie walleyes and yellow perch since 1962. The Bureau also found population changes in Lake Michigan chub; studied the status and potential of Lake Superior commercial fishing industry; studied the population structure of fish in Oahe Reservoir, S. Dak.; advanced its sea-lamprey-control and lake-trout rehabilitation programs; and continued research to develop safe and practical methods for processing smoked fish. A summary of these studies follows.

Alewife population explosion in Lake Michigan.—The alewife population in Lake Michigan continued its rapid expansion. The abundance of adult alewives increased 2.7 times between 1964 and 1965, and young-of-the-year alewives have increased more than 50 times since 1962. The alewife was first reported from Lake Michigan in 1949, was rarely seen in extensive fishery surveys in 1954–55, but in recent years has averaged about 70 percent by number and 60 percent by weight of catches in experimental sampling gear. As the dominance of the alewife has increased, the once abundant lake herring and emerald shiners have almost disappeared, and other important commercial species, such as chubs and yellow perch, also seem adversely affected.

Audiovisual marketing aids.—Major accomplishments in the Great Lakes region in 1965 included the development of audiovisual marketing aids of slide presentations, film strips, and video

tapes that were designed to increase the national acceptance of fresh-water fish. These marketing tools were developed for national use by the vocational educators, agriculture extension leaders, academic class instructors, and Bureau marketing representatives. Such tools, by their use at the National Restaurant Association Convention, school lunch demonstrations and workshops, mass feeding food service operations, and public service television, have been extremely effective in improving the image of fishery products. An important part of this program is to further convey by written word what the listener has seen and heard in the presentation. By using publications, such as "Fish Go in Schools," and recipe folders as a supplement for audiovisual food service presentations, it is possible to put across effectively a well-organized story, and at the same time provide the audience with a written reference to the audiovisual material.

Exploratory trawling in Lake Superior.—The exploratory vessel *Kaho,* which is operated by the Bureau's Exploratory Fishing Base at Ann Arbor, Mich., found extensive concentrations of chubs in Lake Superior during a cruise made in June 1965 in cooperation with the local Area Redevelopment Administration program. This cruise was the fifth in a series designed to help local commercial fishermen harvest underutilized fish in Lake Superior. Explorations were continued in central Lake Superior, and new ones made west of the Keweenaw Peninsula to Duluth, Minn. The hourly catch rate of chubs was 2,600 to 3,300 pounds east of the Keweenaw Peninsula and 3,000 pounds north of Cornucopia, Wis. The average production rate for all drags in which chubs occurred was 755 pounds per hour. The total catch made on the cruise was 21,600 pounds and had 91 percent chubs, 3½ percent lake trout, 2 percent whitefish, 1½ percent smelt, and 1 percent suckers.

Lake Erie walleyes and yellow perch.—In 1965 walleyes and yellow perch had the first strong year classes since 1962. The survival of these species has been erratic since the mid-1950's. The infrequent strong year classes have not provided a stable resource and the fishery has suffered severely. To determine the causes of these fluctuations and to find management procedures that will improve the stability of the stocks and the fishery, the Bureau's Biological Laboratory, Ann Arbor, Mich., is making intensive environmental and biological studies.

Lake Michigan chub population changes.—Composition of the Lake Michigan chub stocks changed from a well-balanced seven-species complex to the present population composed of over 99

percent of one small slow-growing species, the bloater (one of the chubs), that reached extreme abundance in the late 1950's. This change in composition took place because sea lampreys preyed on large chubs and because the reduced population of lake trout (decimated by the sea lamprey) ate fewer small chubs. The alewife also has become abundant, and concurrent with its increase are signs that the bloater population may be in trouble. The influence of the alewife on the bloater is not clear, but an intensive study of newly hatched and young bloaters revealed that they live at middepths where both young and adult alewives are found. The alewives and bloaters compete closely for food and space. The growth rate of the bloater has been increasing each year, and the percentage of females in the population has changed from 72 percent in 1954 to 97 percent in 1965. In other coregonid populations these changes have preceded a sharp decline and near disappearance of a species.

Lake Superior commercial fishing industry status and potential.—A study, paid for by ARA (Area Redevelopment Administration), was made to analyze existing conditions of the Lake Superior fishery, determine if the season of production could be lengthened, develop new products, and evaluate consumer acceptance of these products and the economic feasibility of producing them. Results of the study indicate that a program designed to increase the use of low-valued species, such as chub, cisco, and smelt, through more highly processed and prepared retail and institutional consumer products would substantially benefit the industry. It appears to be economically feasible to produce from these low-valued species acceptable consumer items, with an adequate shelf life.

Missouri River reservoirs.—Changes in the species composition of fish in Oahe Reservoir, S. Dak., demonstrate the usual increase of nongame species after impoundment of the Missouri River into reservoirs; they finally dominate the population. The nongame species in 1965 made up about 80 percent of the fish in Oahe Reservoir; of these, 72 percent were bigmouth and smallmouth buffalo, carp, carpsuckers, and fresh-water drum. A commercial fishery has started on Oahe Reservoir and in 1964-65 took 1,100,000 pounds of the nongame species. Biologists from the Bureau's Biological Laboratory at Ann Arbor, Mich., are studying the population structure of the fish in this reservoir to find management procedures that will create a desirable species balance.

Sea lamprey-control and lake trout-rehabilitation programs.—The Bureau of Commercial Fisheries and the Fisheries Research

Board of Canada, under the direction of the Great Lakes Fishery Commission, made exceptionally good progress in 1965 in sea lamprey control. In U.S. waters, Bureau biologists successfully applied lampricide to 40 streams tributary to Lakes Superior and Michigan. Lampricide, lethal to lamprey larvae but harmless to game fish, effected an 80 percent reduction in the lamprey population of Lake Superior in 1962. Since 1962 the level of lamprey abundance has remained almost constant. Lake Michigan treatments were begun in 1960, and only five infested streams remain to be treated. A reduction in the lamprey population of Lake Michigan will not be evident until 1968.

To speed recovery of the lake trout population, Bureau biologists planted 1.8 million yearling lake trout in Lake Superior and 1.2 million in Lake Michigan. Because of reduced lamprey populations in Lake Superior since 1962, the stocked lake trout are surviving in greater numbers. In 1965, lake trout reproduced naturally in Lake Superior for the first time since 1959; some lake trout reached maturity despite lamprey predation.

Bureau biologists in 1965 made a significant advance in their knowledge of the early life history of lampreys. They completed a study begun in 1960 to determine when lamprey larvae change into the parasitic form. They found that the change begins in the 5th year and may continue for several years.

Smoked fish research program.—The Bureau's Technological Laboratory at Ann Arbor, Mich., continued its research in the Great Lakes area to develop safe and practical methods for processing smoked fish. Federally financed, Bureau-monitored State programs in Illinois, Wisconsin, Michigan, and Minnesota helped the processors to improve their methods. Data for part one of a joint U.S. Public Health Service and Bureau of Commercial Fisheries "Sanitation Guideline for Smoked Fish Establishments" were compiled. Research on the smoked fish process is nearing completion, and much of the information needed for improving processing methods has been given to industry. Application of the guidelines and research data should contribute significantly to preventing bacterial contamination in the smoked fish industry.

General

The Bureau had many activities that were nationwide in effect. Some of them are mentioned here. The Bureau assisted many fishery cooperatives; used newspaper, radio, and television coverage, demonstrated fish cookery, developed recipe booklets, and produced a film to increase sales of fishery products; assembled an-

nual commercial fishery data on each of the 47 States having commercial fisheries; inspected about 225 million pounds of fishery products; provided information to the U.S. fishing industry to encourage orderly marketing of fishery products and byproducts; sought cooperators for the industry–Government fishery marketing program; added to its regulations governing processed fishery products; developed survey instruments; classified fishes; negotiated with several carriers to improve transportation rates and services for fishery products moving in interstate and foreign commerce; tried to ensure that devices at Federal, public, and private water development projects were adequate to maintain or increase fishery resources. These activities are described below.

Cooperatives.—The Bureau advises and assists many fishery cooperatives. Bureau personnel in 1965 gave technical advice and help in solving various tax, legal, financial, and management problems. They also helped organize cooperatives in Alaska, California, and Florida.

Bureau personnel gathered data on the activities of 14 fishery cooperatives in California and found they had complied satisfactorily with the Fishery Cooperative Marketing Act of 1934.

The United States in 1965 had 93 fishery cooperatives with 9,992 members. Several of these cooperatives increased the services offered their members, and most of the marketing cooperatives increased their volume of business. In 1965 only one cooperative failed.

Fishery product publicity.—To increase sales of fishery products, the Bureau used newspaper, radio, and television coverage, put on demonstrations of fish cookery, developed recipe booklets, produced a film, and circulated other films.

The Bureau obtained over 39,000 column inches of editorial space in 273 different newspapers with a total circulation of over 187 million readers. This 5½-fold increase over the 1964 coverage was achieved on the same budget as for the preceding year and shows that editors are increasing their acceptance of Bureau-produced materials.

During 1965, Bureau marketing representatives also arranged for or participated in 113 radio and television shows. These programs informed the public of good buys on fish and seafood, and how to prepare them, and told the public how to obtain fishery publications that were of general interest.

The Bureau's home economists arranged 36 fish cookery demonstrations for decision-makers in school lunch and institutional

feeding groups. A total of 7,193 persons attended these fishery demonstrations.

In addition, the Bureau developed and offered for sale through the U.S. Government Printing Office two full-color recipe booklets, "Fish and Shellfish over the Coals" and "Top o' the Mornin' with Fish and Shellfish."

The Bureau also produced "Flavor of Maine"—the third sardine film that the Bureau has produced for the State of Maine.

Bureau-produced fishery educational films are distributed nationally through 200 cooperating film libraries. Exclusive of television audiences, about 3 million persons in 1965 viewed films on 21 different subjects.

Fishery statistics.—The Bureau assembled annual commercial fishery data on each of the 47 States that have commercial fisheries. These data include the number of fishermen and fishing craft, catch by gear, volume and value of the catch, and production of manufactured fishery commodities. Monthly fish and shellfish landing bulletins for 19 States were issued in cooperation with the State fishery departments. Information was released monthly on freezing and cold storage holdings of fish and shellfish and on the production of fish meal, oil, and solubles. Quarterly reports on the monthly production of fish sticks and portions and breaded shrimp also were issued.

Inspection.—Forty plants subscribed to the Bureau's voluntary fishery inspection program in 1965. Fifty-eight Federal inspectors examined about 225 million pounds of fishery products. Of this total, 214 million pounds were fresh and frozen products and 11 million pounds were canned products. The nine lot inspection offices are located throughout the United States and provide service to the fishing industry, 24 State Governments, 3 Federal agencies, and several large municipalities.

Other activities of the inspection program included the establishment of a mobile inspection laboratory for inspection work in the New England area. The use of the mobile laboratory enabled the Bureau to provide inspection services that were more efficient and less costly to the applicants. Distribution of 75,000 copies of an educational brochure that describes the purpose of the program has made the industry more aware of these services.

Market News Service reporting.—The Fishery Market News Service continued to provide information to the U.S. fishing industry during 1965 to encourage the orderly marketing of fishery products and byproducts and to aid in sound use of our basic fish resources and greater use of resources now relatively untapped.

Market News reporters at the principal fish landing ports and wholesale fish market centers collect and publish daily market data on fishery products and byproducts. This information helps businessmen to determine the markets where fishery products are needed and puts fishermen, dealers, processors, brokers, commission agents, and retailers on an equal bargaining basis.

Marketing cooperators sought.—Bureau marketing personnel greatly expanded their efforts in 1965 to gain both regional and national cooperators for the industry–Government fishery marketing program. The Bureau has long recognized the importance of working alliances with manufacturers of products that are complementary to fish and seafood. The effectiveness of such efforts was exemplified by the large amount of tie-in publicity on a regional and national basis. Fishery products in ample supply were linked with allied products, including meat sauces and spices, citrus fruits, pastry products, metal foils, charcoal briquets, and numerous other items. The key to the success of each promotional tie-in was effective liaison between the Bureau and private industry. The Bureau used public service time in the mass media (newspapers, trade journals, radio, and television) and maintained close working relations with the fishing industry, processors, distributors, and retailers. During 1965, Bureau representatives helped the industry place thousands of point-of-sale banners, recipes, and displays of fishery products. To take advantage of this new marketing promotion, numerous companies were willing to spend money and time in cooperative publicity that linked their brand name products and fishery products.

Standards for fishery products.—During 1965 two significant additions were made to the Bureau's regulations governing processed fishery products. The first addition was the promulgation of new voluntary U.S. standards for grades of raw breaded shrimp. These new regulations reflected a substantial upgrading of the quality requirements for U.S. Grade A shrimp from the original regulations promulgated in 1958. Further, the new standards incorporated two levels of the amount of shrimp for U.S. Grade A raw breaded shrimp. The lightly breaded shrimp must contain at least 65 percent raw shrimp, and the regular breaded shrimp must have at least 50 percent raw shrimp. These two levels are the same as the requirements contained in the new mandatory standards of identity for raw breaded shrimp promulgated also in 1965 by the Food and Drug Administration.

The second significant addition was the promulgation of new regulations for debarment and suspension of fishery inspection

services. These new regulations implement that section of the Agricultural Marketing Act of 1956, as amended, which provides criminal penalties for certain specified offenses. Under these regulations, persons can be suspended or debarred from receiving inspection services when they engage in activities that violate the criminal section of the Act or which abuse or adversely interfere with the successful operation of the voluntary fishery inspection program.

Survey instrument development.—To increase the effectiveness of environmental studies, the Bureau's Oceanographic Instrumentation Program, Washington, D.C., has been developing several basic types of survey instruments. A specially designed, easily read, four-scale electric thermometer, accurate to ± 0.1° C., and with an easily removed and calibrated probe for installation at the cooling water intake, was installed on a Bureau research vessel and on a merchant ship. Preliminary and limited trials have indicated that the thermometer performs satisfactorily. Another instrument, the industry-developed XBT (expendable bathythermograph), has been given trials by merchant ships and Bureau research vessels. These trials resulted in design modifications that will make the instruments more compatible to Bureau requirements.

To improve the quality of instruments, a new type of program management agreement was made with the Navy Oceanographic Office for an industry-developed bathykymograph for use on commercial trawlers. Emphasis is on reliability engineering, availability time, longevity, data handling, and simplicity of application. The instrument, mounted on commercial trawls, gives a record of depth and time of each trawl haul. The resulting data will be used to estimate the U.S. commercial fishing effort in the ICNAF (International Commission for the Northwest Atlantic Fisheries) area.

Scientists and engineers from various Bureau laboratories, a NASCO (National Academy of Science Committee on Oceanography) Panel on Biological Methods, and industry cooperated to determine the effectiveness of present plankton sampling techniques and the engineering requirements for a new generation of nets. Hydrodynamic characteristics of a variety of forms of plankton samplers were measured at various velocities in the David Taylor Model Basin. Related observations on effects of clogging and on avoidance of nets by small fishes and invertebrates were made with instrumented samplers from the submerged, windowed

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laboratories of the Bureau's *David Starr Jordan* and *Townsend Cromwell* and from leased submersibles.

Taxonomy and classification of fishes.—The Bureau's Biological Laboratory, Brunswick, Ga., its Ichthyological Laboratory, Washington, D.C., and its Ichthyological Field Station, Stanford, Calif., continued studies in 1965 on classification of both commercial and noncommercial fishes. A comprehensive systematic and anatomical study of the giant tunas, genus *Thunnus,* was completed, and a study on systematics and distribution of sharks continued. The study on sharks entered a new phase after installation early in 1965 of an industrial X-ray unit that permits a rapid examination of elements of the shark skeleton.

Transportation rates for fishery products.—The Bureau negotiated with several carriers and participated in transportation regulatory proceedings which improved transportation rates and services for fishery products moving in interstate and foreign commerce. The fishery exemption from motor carrier economic regulation continued to be challenged, and the Bureau continuously reviewed this matter because of its vital importance to the U.S. fishing industry.

The staff participated with the Bureau of Domestic Relations, Federal Maritime Commission, in a staff study to review the rates and conditions of the Alaska trade. The staff also planned, drafted, and pretested a questionnaire for a New England Truck Stop-Off Study and completed the first two phases of the study.

Water resource developments.—Participating with State and other Federal agencies in the Willamette Basin Comprehensive Review Study authorized by Congress in 1961, the Bureau in 1965 assessed fish populations, determined measures needed to maintain sport and commercial fisheries associated with the Willamette River, and determined what fish facilities and water were needed to maintain fish resources. Before the review was begun, the Columbia River Development Program had sought agreement for fish passage facilities at Willamette Falls. An agreement was reached, and the first fishway is under construction, financed by Federal and private funds.

The Bureau, the Florida Board of Conservation, and various groups of citizens have brought about the present trend in Florida to set bulkhead lines along the shoreline to conserve valuable natural bay bottoms. The former setting of the bulkhead lines as much as 1,000 feet from shore permitted dredging and filling that destroyed important estuarine areas.

The Bureau's studies of the Texas Water Plan also will be helpful in saving fish and shellfish that will be affected by water resource projects in Texas estuaries.

The Bureau's North Atlantic Region in 1965 reviewed and reported on 109 water resource development projects affecting commercial fishery resources. Most of the problems are associated with alterations of the estuarine and coastal environment resulting from navigation, beach erosion control, and hurricane protection projects planned by Federal agencies or by others under Federal permits. Features that will provide commercial fishery benefits were included in project plans by the Corps of Engineers on eight projects. The Bureau formulated recommendations and conditions regarding offshore disposal of waste materials on eight specific applications. Particularly interesting water resource projects in Region 3 include Salem Church Reservoir, Rappahannock River, Va.; Chesapeake and Delaware Canal, Upper Chesapeake Bay, Md.; Narragansett Bay Hurricane Barrier, R.I.; Storm King Mountain Pumped Storage Project, Hudson River, N.Y.; Canal Electric Power Plant, Sandwich, Mass.; Edgartown Harbor, Martha's Vineyard, Mass.; and Tocks Island Reservoir, Delaware River Basin.

The Bureau participated also in 1965 in comprehensive River Basin studies on the Ohio, Upper Mississippi, and Missouri Basins. The goals of these studies are to determine in broad terms the overall basin requirements for water and related land resource development for many purposes including fish and wildlife and to formulate a general plan of development to meet these needs. For commercial fishery resources in these three Basins, the task has been largely to determine the potential demand, analyze the supply potential of the habitat base, and outline requirements to realize this potential. A comprehensive commercial fishery report on the Ohio Basin was completed.

The Bureau also participated in the Public Health Service (now Federal Water Pollution Control Administration) Great Lakes–Illinois River Basin Project (an approach to water quality and pollution control problems of this area). A report on commercial fishery resources of Lake Michigan Basin was completed.

Water development projects built in Alaska up to 1965 have not required construction of extensive facilities to mitigate for damages caused by the projects. At the Bureau of Reclamation's proposed Lake Grace project near Ketchikan, construction of a dam would make the gravels in the Lake's outlet stream unsuitable for salmon spawning because the stream's temperature regi-

men would be disrupted. When the Bureau of Reclamation decided that a temperature-controlling outlet was not economically feasible, the Bureau of Commercial Fisheries recommended an artificial spawning channel to increase the spawning area at a nearby stream. With the Alaska Department of Fish and Game's concurrence, the Bureau plans to operate this channel for the first 6 years to evaluate and develop criteria for other facilities that may be needed in Alaska.

To maintain or increase fishery resources, the Bureau in 1965 tried to ensure that the best possible fish protective devices were incorporated in and operated at Federal, public, and private water development projects. The Bureau's Fish Facilities Design staff in Portland, Oreg., reviewed design of fish protective facilities, including fishways, screens, locks, elevators, channels, and fish barriers, at projects authorized for construction. In addition to projects in the Columbia Basin, the Bureau provided services on a nationwide basis. Examples of the latter are Rampart Dam, Alaska; Lake Grace Project, Alaska; Tehama-Colusa Canal, the San Francisco Bay Barrier proposal, Oroville Dam, the Sacramento-San Joaquin Peripheral Canal, all in California.

Fisheries Financial Assistance Programs

In fiscal year 1965 the Bureau continued administration of its three loan programs to aid the U.S. fishing industry. A report of the activities of each program follows.

Fisheries Loan Program

The Fisheries Loan Program continued operations that began in the latter part of 1956. Continuation of this Program was authorized by Public Law 89-85, which extended the life of the Fisheries Loan Fund to June 30, 1970, and expanded the purposes for which loans may be made. This Act became effective July 1, 1965. The primary change provided procedures for financing or refinancing the cost of purchasing or constructing a new or used commercial fishing vessel. During fiscal year 1965, 157 applications totaling $2,893,938 were received and 74 for $1,403,908 were approved. The total since the Program began is 1,644 applications for $42,734,194, and of these, 685 for $19,206,671 have been approved (app. C).

Fishing Vessel Construction Differential Subsidy Program

The Fishing Vessel Construction Differential Subsidy Program began in 1960, as authorized by Public Law 86-516. Public Law

88–498, amending P.L. 86–516, was approved August 30, 1964. This legislation modified the Subsidy Program and increased the maximum amount of the subsidy that may be paid from 33 1/3 to 50 percent of the domestic cost. Funds in the amount of $2,500,000 were appropriated to carry out the purposes of the Act during fiscal year 1965. To qualify for a subsidy, the vessel must have an advanced design that will enable it to operate in more distant areas and must be equipped with newly developed gear. The vessel will not operate in a fishery if doing so would cause economic hardship to efficient vessels already in that fishery. A public hearing is required on each application before a finding of eligibility can be made. After regulations were adopted in December 1964, the first applications under this revised Program were received. As of June 30, 1965, 39 applications for subsidies estimated at about $8 million were received under the expanded Program. Of these, 22 were from New England, 8 from the Gulf Coast area, 7 from California, and 2 from Seattle, Wash. After a hearing, 17 of these applications were approved, and construction of one subsidy vessel was begun at the end of fiscal year 1965.

Fishing Vessel Mortgage and Loan Insurance Program

The Fishing Vessel Mortgage and Loan Insurance Program, which provides for Government insurance of mortgages given for construction, reconstruction, or reconditioning of fishing vessels, was continued during fiscal year 1965. During the year, 21 applications for insurance amounting to $2,491,684 were received, bringing the total to 77 for $7,469,992. Nineteen applications involving $1,880,946 were approved during the year, and 7 for $1,932,342 were pending as of June 30, 1965. Since this Program began in 1960, approvals totaled 63 for $4,850,967. Vessel owners and lending agencies continued their interest in this Program throughout the year.

American Fisheries Advisory Committee

The American Fisheries Advisory Committee consists mostly of industry members. The Secretary of Interior appoints these members under authority of the Saltonstall–Kennedy Act. Their function is to submit to him advice and recommendations on fishery matters regarding formation of policy, rules, and regulations relating to requests by industry for assistance and other matters deemed appropriate by the Committee Chairman. The

Committee met in 1965 in Washington, D.C., May 6 to 8 and in San Pedro, Calif., October 25 to 28.

A list of the Committee members in 1965 is given in appendix D.

New Programs

In 1965 the Bureau began several new research programs. One program included research on the Atlantic menhaden; another involved economic analyses of consumer buying habits in relation to buying fish and seafood products, of trend and change in market structure and distribution patterns in U.S. shrimp industry, of costs and efficiencies of containers for handling, transporting, and processing fresh fish products, of distribution of fish and fish products originating from Boston Fish Pier landings, and of development of the unloading process of fish in New England fishing vessels and piers. Other new programs are the establishing of economic situation and outlook reports to cover all major fishery commodities; studies of genetics of mollusks; an inventory of the estuaries in the Gulf of Mexico; an oceanographic study of the Gulf of Mexico; and investigation of king crab stock in the eastern Bering Sea. Still other new programs are ocean engineering investigations in Alaska and on the Pacific Coast; reporting of oceanographic conditions in the Northeast Pacific Ocean; establishment of a skipjack sampling station on Palau; research on early sea life of sockeye salmon; and construction of sonar gear for fishing.

Atlantic Menhaden

The Bureau's Biological Laboratory at Beaufort, N.C., is tagging Atlantic menhaden to find answers to these questions:

1. Are there subpopulations in the stocks?

2. What are the seasonal migrations and how do they affect age and size distribution?

3. What are the rates of fishing mortality, natural mortality, and growth?

4. What is the best size or age of capture?

5. What is the size of the stock and how does fishing affect the yield?

6. What is the contribution of various nursery areas to the fishery?

Economic Research

The Bureau began five economic research projects in 1965 and plans to complete them in 1966 or 1967. These are:

1. An economic analysis of consumer buying habits as related to purchase of fish and seafood products.

2. An economic analysis of trend and change in market structure and distribution patterns in the shrimp industry in the United States.

3. The distribution of fish and fish products originating from Boston Fish Pier landings.

4. An economic analysis of costs and efficiencies of containers for handling, transporting, and processing fresh fish products.

5. A study for development of the unloading process of fish in New England fishing vessels and piers.

Economic Situation and Outlook Reports

Plans for Economic Situation and Outlook Reports were developed during 1965 to cover all major fishery commodities. One report will cover shellfish, a second will deal with food finfish, and the third will discuss industrial fishery products. Each year one of the four issues in each series will be an annual review. The reports have text plus considerable tabular data and many charts to illustrate economic trends and conditions.

Genetics of Commercial Mollusks

The Bureau's Biological Laboratory at Milford, Conn., is making an intensive study of genetics of commercial mollusks. Line-breeding experiments have begun with four oyster species as a basis for later hybridization and selective breeding. This study is expected to be a long-term effort to develop new stocks of shellfish with characteristics that are commercially desirable.

Gulf of Mexico Estuarine Inventory

The Bureau's Biological Station at St. Petersburg Beach, Fla., and the Estuarine Technical Coordinating Committee of the Gulf States Marine Fisheries Commission, New Orleans, La., are planning an estuarine inventory of the Gulf of Mexico.

Gulf of Mexico Oceanography

The Bureau's Biological Laboratory at Galveston, Tex., began an oceanographic study of the Gulf of Mexico. The Bureau's research vessel *Geronimo* was transferred to Galveston for use

in this study. An investigation of the oceanography of this region will provide information that is valuable for understanding the ecology of the commercial species there.

King Crab Stock in the Eastern Bering Sea

A joint research program devised by Bureau and U.S.S.R. scientists to determine the maximum sustainable yield of the king crab stock in the eastern Bering Sea began in 1965. U.S. and U.S.S.R. scientists exchanged publications, catch statistics, and research data and worked together for about 2 months observing U.S. and U.S.S.R. king crab research, fishing, and processing activities.

Ocean Engineering in Alaska

In July 1965 the Bureau began a program to hasten development of some latent fisheries in the Gulf of Alaska and the Bering Sea. Personnel from the Bureau's Exploratory Fishing Base in Juneau, Alaska, explored for shrimp in the bays along Stephens Passage, on the west side of Kuiu Island, and on the southeast side of Baranof Island. Commercial concentrations were not found in any area explored.

Gear studies with seven types of shrimp pots were made at the same time. Most of the work was done in the Keku Strait and Tebenkof Bay areas which yielded 90 percent of the total catch. Wooden pots appeared to be the most effective gear for spot shrimp.

Ocean Engineering on the Pacific Coast

The Bureau's Exploratory Fishing Base in Seattle, Wash., began a program in 1965 on the Pacific Coast to solve some problems affecting the newly developed midwater trawl. These problems were controlling and measuring the depth at which the trawl operates, evolving effective means of fish retrieval, and finding an efficient method for handling the large trawl from small vessels. To solve these problems, the Bureau's chartered commercial trawler *Western Flyer* completed 100 days of simulated commercial fishing for Pacific hake. The 170 trawl drags produced 872 tons of hake. The experimental nets, cable, and depth telemetry system, operated by commercial fishermen, were found suitable. The Bureau's technical assistance and equipment enabled a commercial trawler to catch 735,000 pounds of hake between November 20 and December 16.

Oceanographic Conditions in the Northeast Pacific Ocean

The Bureau's biological laboratories in the Pacific and the U.S. Naval Fleet Numerical Weather Facility, Monterey, Calif., in 1965 began a system for reporting oceanographic conditions in the northeast Pacific Ocean. Seven vessels sent daily environmental reports to the oceanographic program in Seattle. Bureau radio station KAB was equipped to handle these as well as local reports from fishing vessels.

Skipjack Sampling Station on Palau

The Bureau's Biological Laboratory in Honolulu, Hawaii, established a sampling station on Palau to obtain information on the substantial skipjack fishery in what is now the Trust Territories of the Pacific Islands. Data on the skipjack population of the western Pacific will be obtained. Prior to World War II, the Japanese were the principal skipjack fishermen in the area. An American freezing plant also has been built on Palau.

Sockeye Salmon

Research on the early sea life of sockeye salmon was begun in Bristol Bay, Alaska. As part of this study by the Bureau's Biological Laboratory in Auke Bay, Alaska, the course of Naknek River water through Kvichak Bay was tracked by means of fluorescent dye and by temperature and salinity sampling. Purse seines were the most successful gear for sampling young sockeye salmon in the Kvichak River estuary. Young sockeye salmon from all river systems of Bristol Bay were found to be concentrated in a band up to 20 miles wide along the north shore of the Alaska Peninsula; these fish were followed as far west as Port Moller.

Sonar for Fishing Vessels

Because conventional methods are not adequate to locate subsurface tuna schools or to study their behavior, the Bureau let a contract late in 1964 for construction of a continuous-transmission, frequency-modulated sonar for installation on the vessel *Townsend Cromwell.* Fishery scientists at the Bureau's Tuna Resources Laboratory, La Jolla, Calif., will use the sonar on specific problems, such as how the fish are spaced in subsurface schools, how deep they usually swim, and other aspects of behavior. Installation of the sonar was scheduled for the spring of 1966.

Meetings

Bureau officials participated in various international meetings and conferences during 1965. This participation included preparation of position papers, background papers, and similar studies for U.S. representatives. In several instances, Bureau officials served as officers of these meetings and of the organizations under whose aegis the meetings were held. The primary purpose of participating in such meetings and conferences was to promote policies favorable to the U.S. fishing industry. The meetings ranged from ad hoc meetings on specific issues to regular meetings of international organizations concerned with fisheries. Subjects discussed at these meetings included rational harvest of fish, jurisdiction over fisheries, international trade problems, and scientific research. A summary of important 1965 meetings follows.

Food and Agriculture Organization of the United Nations (FAO)

At its 44th session in Rome, June 21 to July 2, 1965, the FAO Council approved elevating the Fisheries Division to the Department of Fisheries, with an Assistant FAO Director-General for Fisheries. The Council also approved a Permanent Committee on Fisheries and generally endorsed the Director-General's proposals for strengthening fisheries within FAO.

At the 13th session of the FAO Conference in Rome, November 20 to December 10, 1965, the major program-review body of the Conference approved plans to expand and intensify FAO's fisheries work. The Conference's commission that examines FAO technical work voted to raise the present Fisheries Division to departmental status. Its recommendation is to be voted on by the Conference plenary, which meets in 1966.

The Working Party for Rational Utilization of Tunas in the Atlantic, convened by FAO in October 1963 to develop a draft Convention, completed its assignment at a second meeting in Rome in July 1965. The Working Party reviewed a draft provided by the United States and adopted a draft Convention that was based on the U.S. draft. The draft adopted by the Second Session of the Working Party was presented to the Director-General of FAO, who is expected to call a conference of plenipotentiaries in 1966 to negotiate an international convention for conservation of Atlantic tunas.

Great Lakes Fishery Commission

United States and Canadian fishery scientists at the 10th

annual meeting of the Great Lakes Fishery Commission in Ann Arbor, Mich., June 22 to 24, 1965, reported on the continued increase in lake trout populations in Lake Superior. They attributed this recovery to the 80-percent reduction in sea lamprey populations and annual planting of hatchery-reared yearling lake trout to supplement natural spawning in inshore areas. All but two of the sea lamprey-producing streams in Lake Superior have been chemically treated at least once, and more than half have been treated twice. Despite a substantial population reduction, however, lampreys still abound in certain isolated areas. Scientists at the meeting agreed that several problem streams should be investigated intensively.

Good progress in lamprey control was made in Lake Michigan also. The chemical treatment program began in the Lake in 1960, proceeded on schedule in 1965, and should be completed in June 1966. In spring 1965, the Lake received 1.2 million yearling fish —its first substantial lake trout planting.

Inter-American Tropical Tuna Commission

At its 17th annual meeting in Mexico City, March 23 to 26, 1965, the Tuna Commission recommended a 1965 catch quota of 81,800 tons for yellowfin tuna in the eastern Pacific. This quota should permit the yellowfin tuna stocks to rebuild themselves in about 4 years to a level that will produce the maximum sustainable annual yield of about 91,500 tons. The member nations (Costa Rica, Ecuador, Mexico, Panama, and the United States) pledged themselves to do everything legally possible to induce other nations (Peru, Japan, Chile, Canada, and Colombia) fishing in the area to cooperate in the regulatory program. Except for Peru and Chile, these nations have pledged themselves to put regulations into effect when this becomes necessary. Peru and Chile so far have not agreed to cooperate under conditions acceptable to most member nations of the Tuna Commission. Although the Tuna Commission has recommended each year since 1961 that the catch of yellowfin be limited by an annual quota, the fishery thus far has not been placed under such control.

International Biological Program (IBP)

At their meeting May 29 and 30, 1965 in Washington, D.C., the U.S. National Committee of IBP and its subcommittees developed a preliminary framework for the U.S. share of this Program. The Bureau has an interest in the subcommittees on Productivity of Fresh-water Communities, Productivity of Marine Communi-

ties, and Use and Management of Biological Resources. The Bureau is actively participating in the work of the Interior IBP committee.

International Commission for the Northwest Atlantic Fisheries (ICNAF)

Scientists at ICNAF's 15th annual meeting in Halifax, Nova Scotia, Canada, June 5 to 12, 1965, were concerned over the increased fishing on Northwest Atlantic fishery resources. It was noted that fishing intensity on cod and haddock resources appeared to be at or beyond the point of maximum sustainable yield. Catch quotas, in addition to mesh regulations on trawl nets, were considered to be the most feasible types of regulation. The member nations (Canada, Denmark, Federal Republic of Germany, France, Iceland, Italy, Norway, Poland, Portugal, Spain, United Kingdom, United States, and U.S.S.R.) were asked to consider the effects of quota restrictions so the Commission could study this matter at its 1966 meeting. In this regard, the FAO representative at ICNAF's meeting stated that FAO would sponsor a meeting in the autumn of 1965 to explore the economic aspects of regulating the fisheries.

Canada, the United States, and the U.S.S.R. reported on their May 1965 exchanges of inspection officers. The Commission pointed out to the other member nations that such exchanges were valuable means of learning about each other's enforcement procedures and problems.

Denmark reported that the catches of Atlantic salmon increased from 55 metric tons in 1960 to 1,450 metric tons in 1964. Fish born in streams of both North America and Europe were caught off the Greenland Coast. Canada and the United Kingdom asked that Greenland fishermen not expand their salmon fishery until the effects of this fishing could be evaluated. Denmark indicated that Greenland communities depend on fisheries and that data were lacking to show the need for restricting salmon catches.

ICNAF's Assessment Subcommittee stated that present data are insufficient to determine if the Greenland salmon fishery is affecting "home" fisheries. To determine this effect, the Subcommittee felt that studies should be made of the potential yield of salmon stocks in Europe and North America, taking into account estimated natural losses at sea. The Subcommittee then recommended the following studies in affected areas of North America, Europe, and Greenland: (1) collecting monthly salmon catch and fishing effort data, preferably by river of origin; (2) sampling catches for length, weight, and age data; and (3) tag-

ging salmon as intensively as possible. The Subcommittee recommended also that efforts should be made to identify the North American and European components of the Greenland catch by analyzing various biological characteristics.

International North Pacific Fisheries Commission (INPFC)

At its 12th annual meeting in Seattle, Wash., November 8 to 12, 1965, INPFC reviewed the results of conservation programs and scientific research on North Pacific fishery resources and discussed their implications for fishing industries of the member countries (Canada, Japan, and the United States). As in the past 2 years, INPFC did not recommend any change in the list of fish stocks that are subject to the abstention provisions of the North Pacific Fisheries Convention.

INPFC also recommended conservation measures for the halibut fishery in the Bering Sea. The stringent controls recommended for that fishery in 1964 were relaxed slightly with a 2-day extension of fishing time over the 7-day open season of 1965. Some conservation measures, including a legal size for halibut, were also included in INPFC's recommendations for the Bering Sea fishery. The northeastern Bering Sea area will remain open until November 15, 1966, for exploratory and experimental longline fishing for halibut.

INPFC also studied how trawl fisheries for other species affect halibut stocks in the Gulf of Alaska. INPFC recommended more intensive research on that problem and noted that efforts are being made to minimize the incidental catch of halibut in that area.

In response to requests from Japan and the United States, INPFC will continue its studies on Bering Sea king crab and will report results to them for their guidance in drawing up conservation measures for the crab fishery. Canada asked to be informed of these results.

INPFC also discussed the high-seas salmon fishery in the area where Asian and North American stocks intermingle west of long. 175° W., but did not agree on that problem.

International Whaling Commission (IWC)

At a special IWC meeting in London May 3 to 6, 1965, called by the Chairman as a result of action initiated by the United States, the Antarctic whaling nations (Japan, Norway, and U.S.S.R.) agreed to (1) reduce substantially their catches of Antarctic baleen whales for the 1965-66 season and (2) recom-

mend to their governments further reductions in the 1966–67 and 1967–68 seasons so that the whale stocks would be able to rebuild. The 17th annual IWC meeting in London June 20 to July 2, 1965, approved this action and established a reduced quota for the 1965–66 season. The annual meeting also reapproved a prohibition on taking blue whales south of lat. 40° S.

North Pacific Fur Seal Commission (NPFSC)

At its eighth annual meeting in Tokyo February 22 to 26, 1965, NPFSC reviewed and approved the 1964 research and management work on the fur-seal herds of the Commander, Robben, and Pribilof Islands. NPFSC also reviewed and approved the 1965 plans that the party governments (Canada, Japan, United States, and U.S.S.R.) developed for fur-seal investigations on land and sea. NPFSC also sponsored a joint research project begun in 1965 to provide data on quality of sealskins by sex, age, and time and method of sealing. Under this project, each party government provided 50 sample sealskins taken under specified conditions. Two hundred sample sealskins were shipped to Fouke Fur Company, Greenville, S.C., where uniform methods would be used for pooling, processing, and grading.

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

The Bureau makes additional use of its facilities and the skills of its scientists by cooperating with various States, universities, private organizations, other Federal agencies, and foreign governments. The Bureau also profits from the information coming from these groups. International agreements and treaties and formal and informal agreements provide for these exchanges of ideas and results.

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, and the International North Pacific Fisheries Commission, coordinate the research efforts of several countries.

Cooperation with Federal Agencies

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

Cooperation with Federal Agencies

Cooperation with Atomic Energy Commission.—Under a contract agreement with the Atomic Energy Commission, the Bureau made two 1965 cruises off the Washington and Oregon Coasts. The Bureau's vessel *John N. Cobb* made 11 drags with a 400-mesh Eastern trawl in water depths between 90 and 756 feet. These drags included those off the Washington Coast in which resurveys were made of areas where the *John N. Cobb* previously had made bottomfish drags. This was the first attempt to establish standard otter trawl stations to be surveyed during later cruises. The dominant species by weight and their corresponding maximum catch rates were English sole (1,500 pounds per hour), sanddab (800 pounds per hour), skates (700 pounds per hour), sand sole (200 pounds per hour), and butter sole (200 pounds per hour). Five white sturgeon, each weighing 35 to 80 pounds, were taken off the north Washington Coast in water depths of 222 to 294 feet. Only English sole were taken in commercial quantities.

Cooperative Observance Programs.—The Secretary of Agriculture designated October as Cooperative Month and the week of October 4 to 8, 1965, for the annual Cooperative Observance Program. Fifteen States and 23 nongovernment groups observed October as Cooperative Month. For the first time the observance was Government-wide, and Federal agencies sponsored nine seminars. The purpose of the Department of the Interior's seminar on October 5 was to provide a better understanding of the role of cooperatives in the Department's programs. About 120 people, including national and world leaders in the cooperative movement, attended these seminars.

Economic Development Administration.—Passage of the Public Works and Economic Development Act of 1965 (P.L. 89-136; 79 Stat. 552) created EDA (Economic Development Administration) within the Department of Commerce. EDA superseded ARA (Area Redevelopment Administration), which expired June

30, 1965. The program of EDA was greatly expanded over that of ARA. The EDA Liaison Office of the Bureau of Commercial Fisheries continued to work closely with officials of EDA and the Bureau's Regional Offices on EDA projects involving the U.S. fishing industry.

The Bureau continued to monitor projects, such as the biological, technological, and economic studies of the Maryland soft clam industry that are undertaken by the University of Maryland; and the survey of the potential of expansion in the seafood industry in Carteret County, N.C. These two projects were already in operation and financed by ARA funds.

Exploratory fishing was also carried on in conjunction with a study to improve the commercial fisheries sector of the Lake Superior economy.

At EDA's request, the Bureau during 1965 reviewed numerous new projects. These included a proposal for improving clam and oyster production in Oregon, research in processing Louisiana crawfish, and research in propagating seed oysters in the James River area of Virginia. The Bureau's Regional Office at Ann Arbor, Mich., proposed to EDA to expand the project for providing advisory services to Lake Superior fisheries to permit greater use of the results of previous studies and to rehabilitate the fishing industry. EDA approved the project.

Training program assistance to Agency for International Development (AID).—During 1965 the Bureau arranged training programs in fisheries-related subjects for 18 participants from 9 countries (Brazil, Cambodia, Ghana, Israel, Nigeria, Pakistan, Republic of Korea, Tanzania, and Thailand). AID recommended the participants and financed them. Eleven participants received practical training arranged by the Bureau's Regional Offices, and 7 undertook academic training for the purpose of obtaining degrees.

Cooperation with States

The Bureau cooperates with interstate commissions, such as the Atlantic States Marine Fisheries Commission and the Gulf States Marine Fisheries Commission. These Commissions coordinate the research efforts and conservation actions of the States involved in such compacts. This coordinated action, effected through formal agreements, is based chiefly on data provided by Bureau scientists.

All coastal and inland States having commercial fisheries also

have cooperative arrangements with the Bureau for collecting and compiling fishery statistics.

The Bureau cooperated also in a bottomfish trawl survey with the Florida Board of Conservation. At the request of industry, the two agencies cooperated from April to July 1965 in a trawl survey along the Florida west coast to assess the potential for bottomfish in the area. Modified New England roller-rigged trawls 30 and 39 feet each were fished from the Florida Board of Conservation's R/V *Hernan Cortez.* Although not conclusive, results from trawls at 213 trawl locations did not show commercial concentrations of marketable bottomfish.

Cooperation with National, Regional, and Local Groups

Cooperative Guinea Undercurrent survey.—During a cooperative survey in autumn 1965 scientists on the University of Miami's R/V *Pillsbury* and the Bureau's R/V *Geronimo* measured in detail the Guinea Undercurrent. This subsurface, westerly flowing current in the Gulf of Guinea was discovered from the *Geronimo* in 1963. As a result of the measurements in 1965 and those by scientists from the Bureau and Columbia University in 1964 from the *Geronimo,* the first estimates of an annual, balanced net transport in the Gulf of Guinea were possible.

Federal Reserve Bank of Boston Conference on New Developments and Research in Fisheries Economics.—The purpose of the Boston Conference December 9 and 10, 1965, was to bring together individuals in the academic field, industry, and State and Federal Governments who are involved in and affected by developments in commercial fishery economics. The Conference served to make available results of completed research, to coordinate and improve current research, to point out areas of needed research, and to stimulate new ideas for research. The published proceedings will be a useful guide to private and public policy makers and economics researchers.

Lake Superior Commercial Fisheries Conference.—The purpose of the Lake Superior Conference at Marquette, Mich., October 11, 1965, was to examine the status and potential of the commercial fishing industry on Lake Superior. Interests from all aspects of the industry were represented at the Conference. These included representatives of Federal and State Agencies involved in research, management, and control of the Lake Superior fishery, Lake Superior fishermen and processors, and a member of the U.S. House of Representatives. The Conference pointed out biological, economic, and technological problems of the industry,

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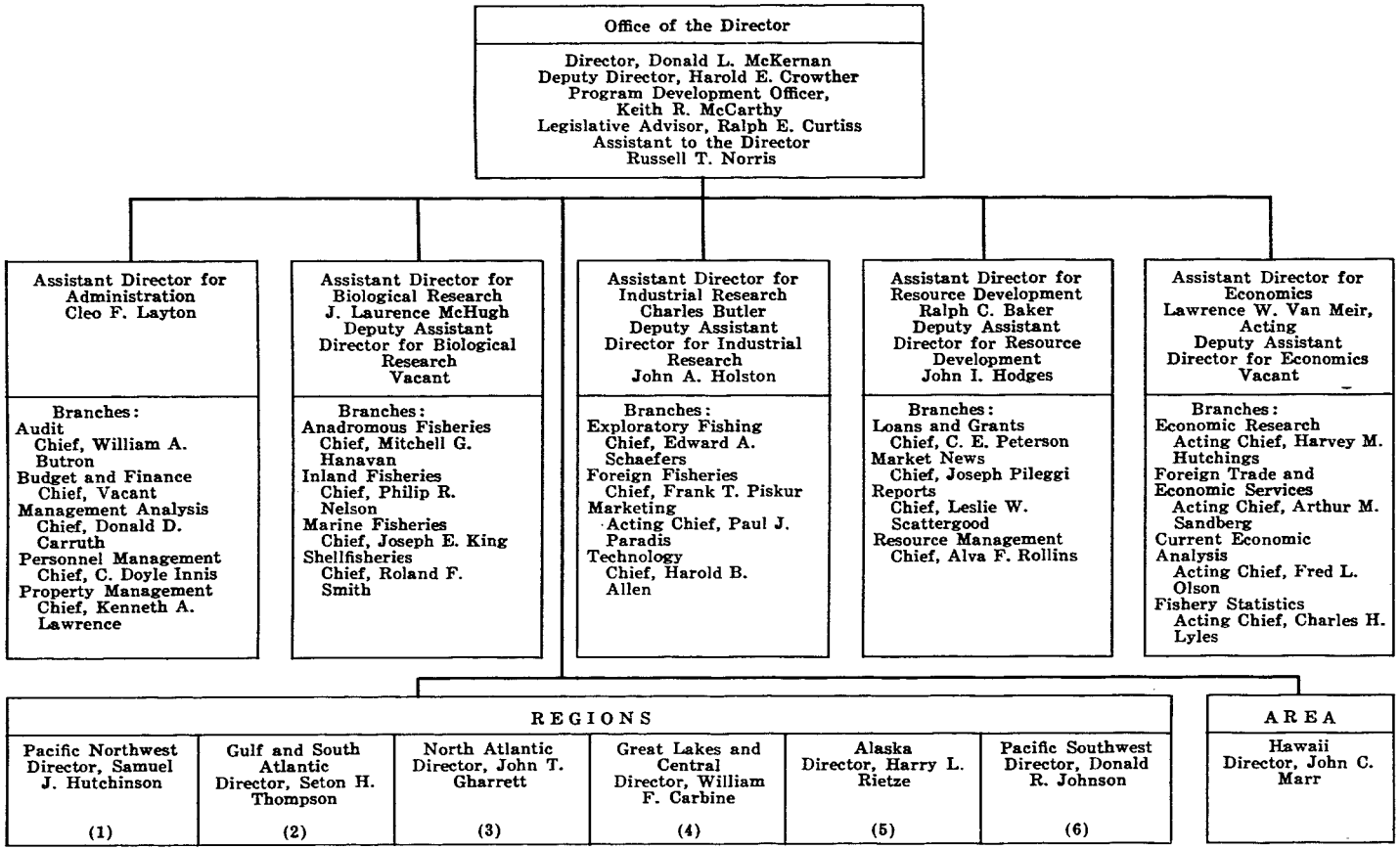

FIGURE 1.—Organization Chart, Bureau of Commercial Fisheries, December 31, 1965.

evaluated the success of current rehabilitation efforts of State and Federal Governments, and indicated required areas of future efforts by the Agencies. The Conference created a better understanding of current problems and pointed out desirable future efforts needed for improving economic conditions in the Lake Superior fishery.

Organization, Employment, Budget, and Physical Properties

The following summary describes the Bureau's organization, employment, budget, and physical properties.

Organization

In 1965 no changes occurred in the organization of the Bureau. A chart of the Bureau's organization as of December 31, 1965, is shown in figure 1, and a map of the six regional and one area offices as of December 31, 1965, and the territory under each is shown in the frontispiece.

Employment

Employment for the Bureau averaged 2,216 throughout calendar year 1965 (1,867 permanent and 349 seasonal employees). The peak employment in 1965 was reported at the end of July when the staff consisted of 1,872 permanent and 649 seasonal employees—a total of 2,521. The variations in the number of employees throughout 1965 and the relation between the total number and the number of permanent employees and seasonal, or temporary, employees are shown in figure 2.

Bureau employees fall generally into four broad categories. Of the total 2,052 full-time employees reported as of October 31, 1965, 910 were classified in about 48 professional and technical series; 299 in 12 subprofessional series; 496 in 33 clerical and administrative series; and 347 were in positions, the pay of which is determined outside the Classification Act (175 vessel positions, 172 other). Figure 3 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, 1965.

Budget

For fiscal year 1965, $42.1 million were available to carry out the Bureau's programs (app. F). Of this amount, $33.0 million were from annual appropriations; $5.2 million from Public Law

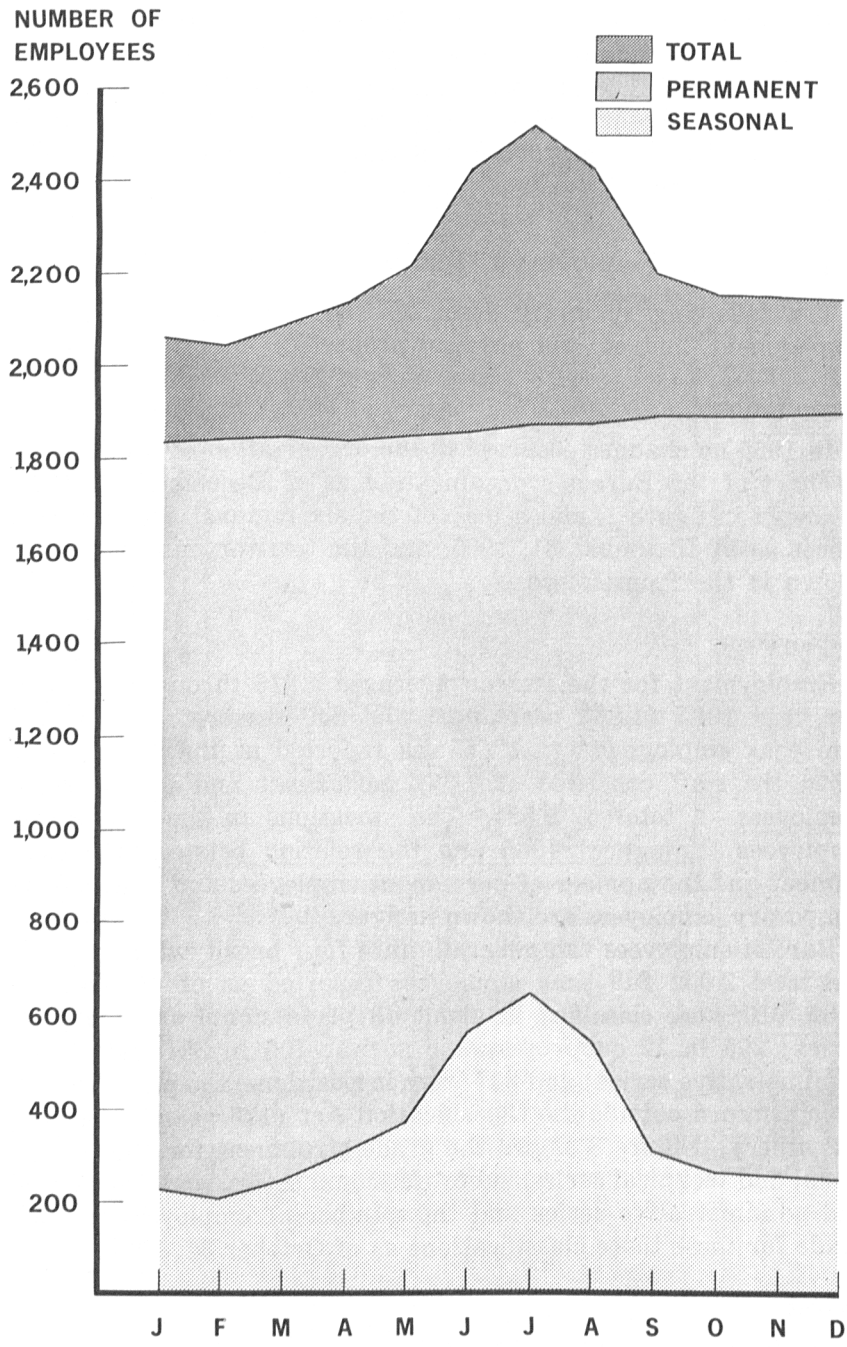

FIGURE 2.—Bureau of Commercial Fisheries employment totals by month, calendar year 1965.

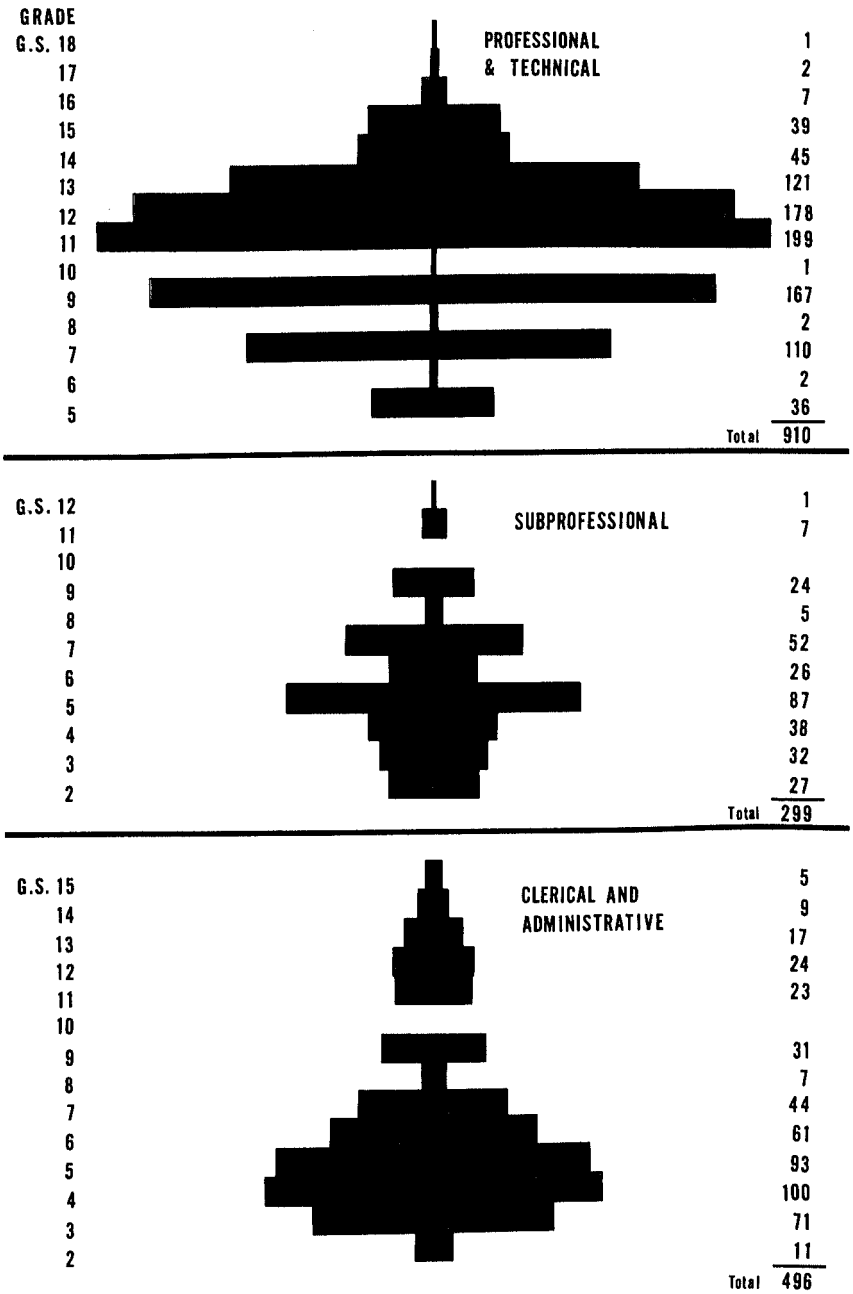

FIGURE 3.—Distribution by grade of professional and technical, subprofessional, and clerical and administrative employees, Bureau of Commercial Fisheries, October 31, 1965.

466 (known as the Saltonstall–Kennedy Act) funds; $0.77 million made available to the Bureau by the Great Lakes Fishery Commission; and $0.63 million from members of the fishing industry for inspection and grading of fishery products.

Figure 4 shows the available funds to carry out the Bureau's program for each year from 1957 to 1965.

Physical Properties

Field laboratories and stations, vessels, and installations on the Pribilof Islands are the principal properties of the Bureau (app. G). In fiscal year 1965, replacement and improvement of Bureau facilities continued and new projects for construction were begun. In fiscal year 1965, there were 25 large laboratories and installations, 75 smaller stations and offices, and 30 vessels of 40 feet and longer. Figures 5, 6, and 7 show the Bureau's principal fishery biological research laboratories, and figure 8 shows the principal exploratory fishing and gear research and technological laboratories.

Four laboratories were under construction in 1965, and three of these were completed. In January 1965 the biological laboratory at Seattle, Wash., was completed. It provides space and improved scientific facilities for oceanographic research and biological research on stocks of marine and anadromous fishes of the North Pacific Ocean and for the national program for research on fish passage problems.

A research laboratory at Ann Arbor, Mich., was completed also and occupied in September 1965. The laboratory provides facilities for studying details of environmental characteristics, physiology, behavior and biology of fish, and new methods of processing and preserving fish. Research in these fields is providing an understanding of the complex changes taking place in the Great Lakes and inland waters, and filling vital needs for management and efficient use of rapidly changing fish stocks.

The third laboratory completed was the Tropical Atlantic Biological Laboratory at Miami, Fla. In joint ceremonies on November 20, 1965, the Bureau and the Institute of Marine Science, University of Miami, dedicated the Laboratory. The Laboratory is on 5 acres of land deeded to the Federal Government by Dade County. Containing 48,300 square feet of space, this three-story Laboratory is made of precast, prestressed concrete. Its many facilities include research laboratories and aquarium spaces furnished with running sea water, facilities for behavior and physiological studies under conditions of controlled

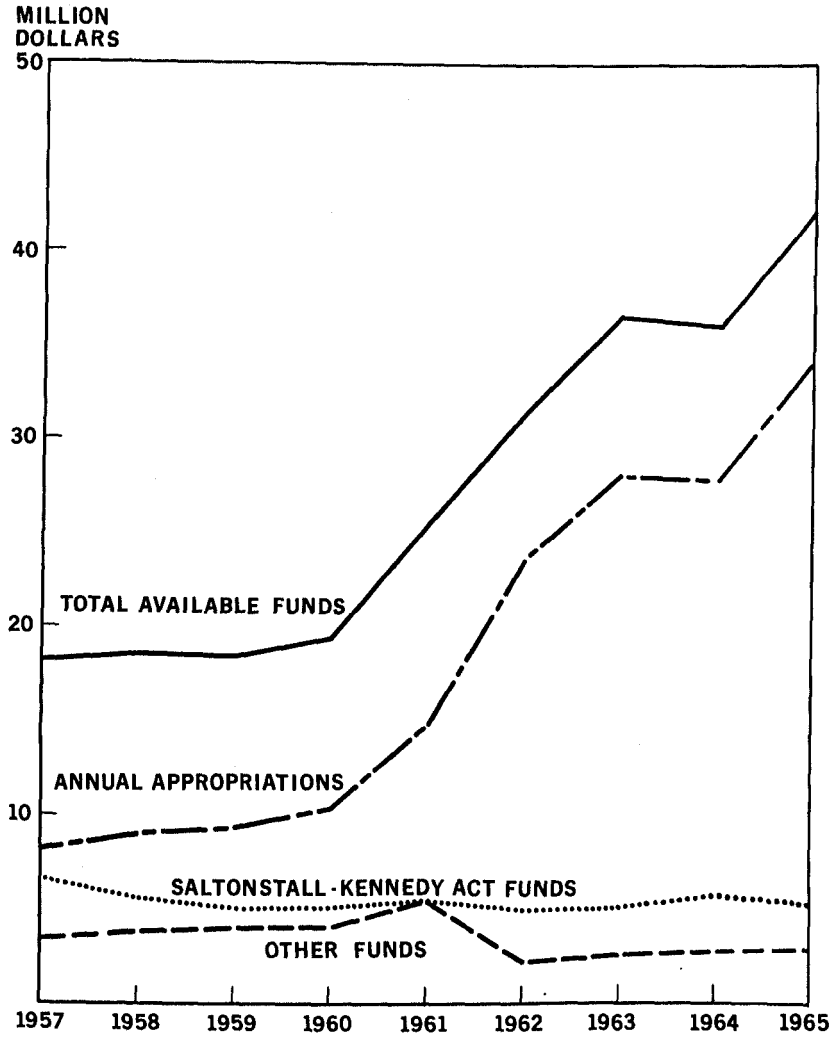

FIGURE 4.—Funds available to the Bureau of Commercial Fisheries, fiscal years 1957–65.

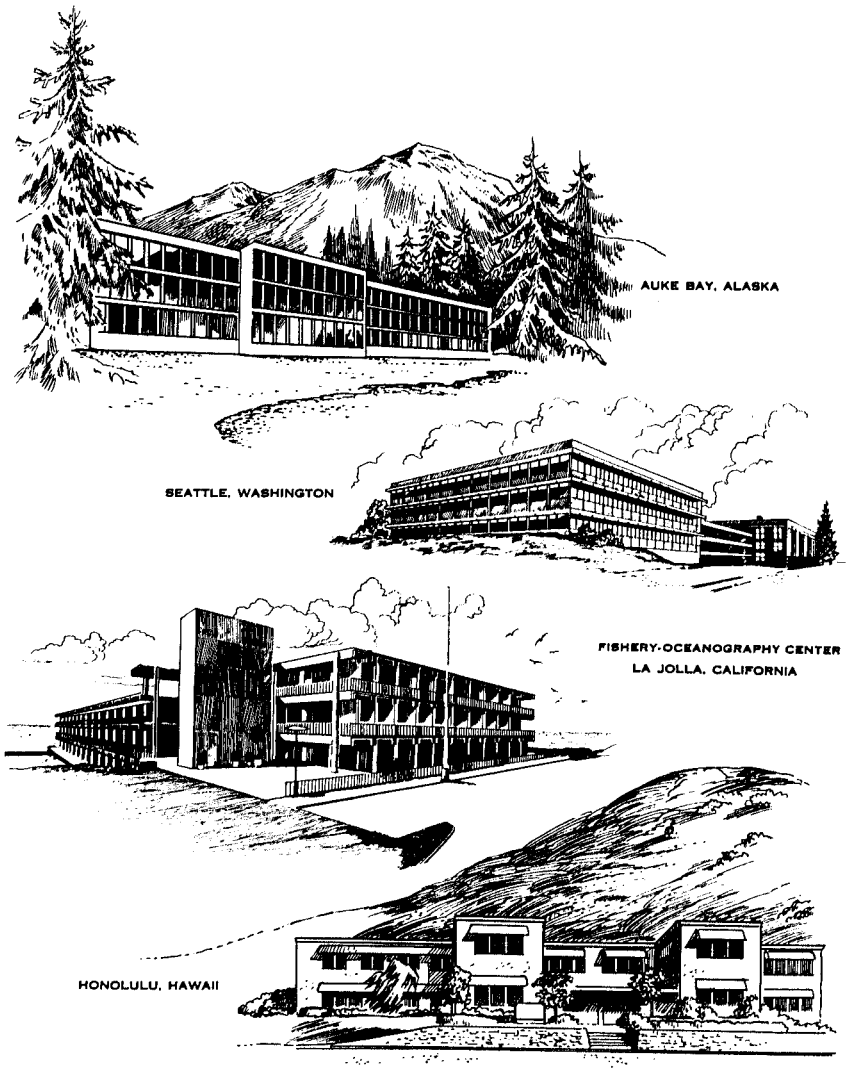

FIGURE 5.—Bureau of Commercial Fisheries biological laboratories, Pacific, 1965.

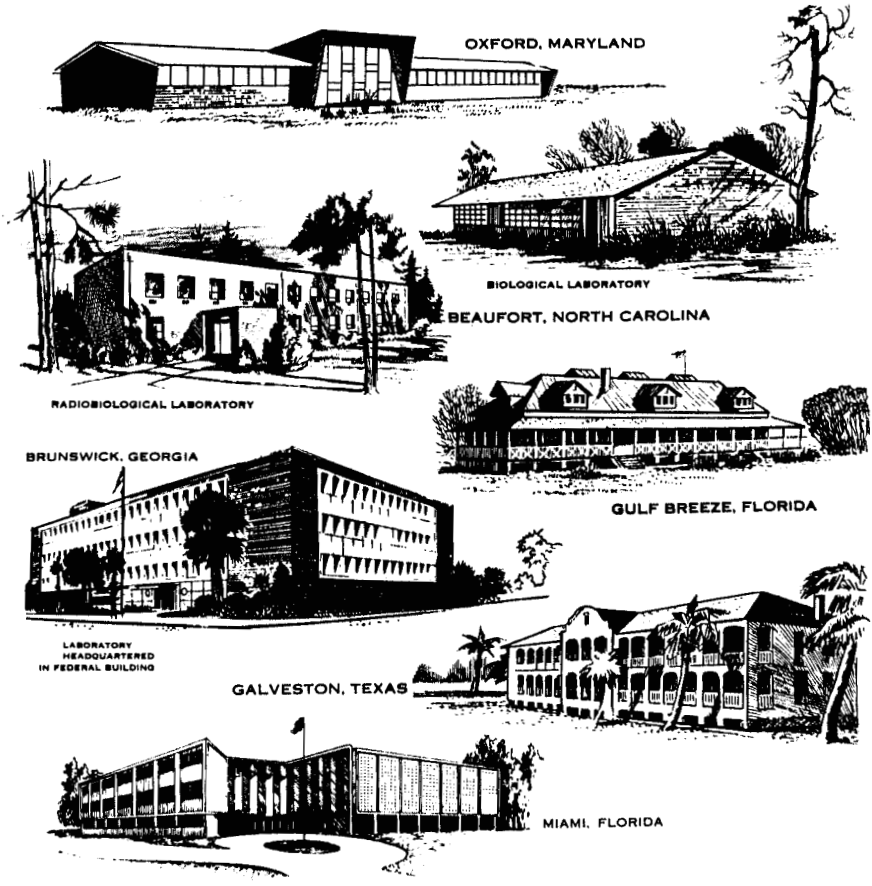

FIGURE 6.—Bureau of Commercial Fisheries biological laboratories, Middle and South Atlantic and Gulf Coast, 1965.

FIGURE 7.—Bureau of Commercial Fisheries biological laboratories, North Atlantic and Great Lakes, 1965.

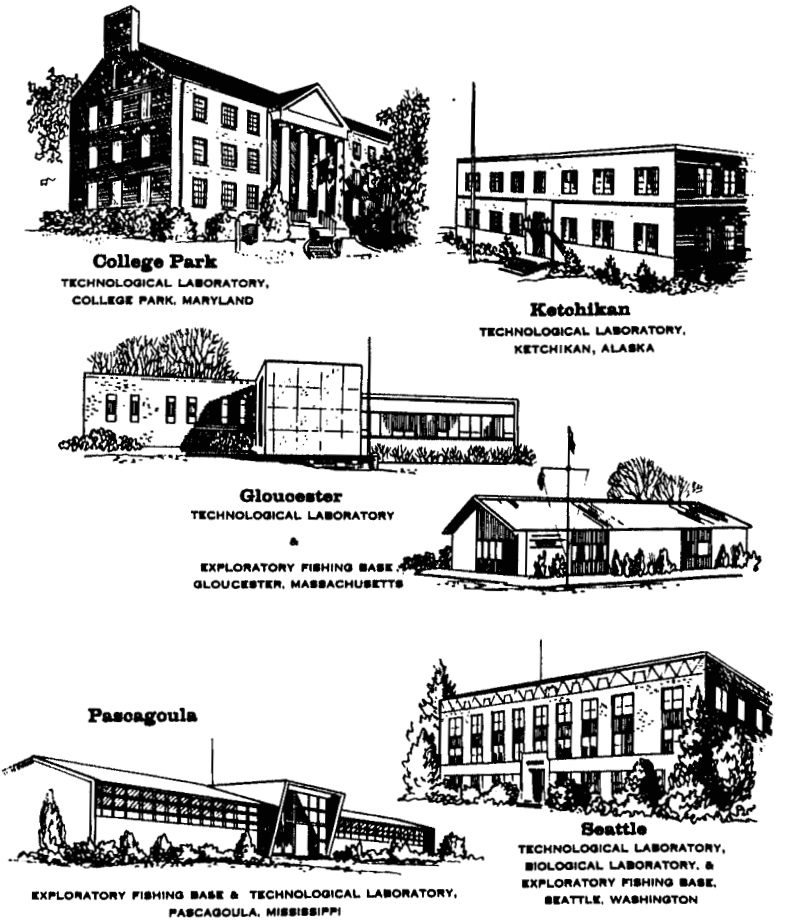

FIGURE 8.—Bureau of Commercial Fisheries exploratory fishing and gear research and technological laboratories, 1965.

environment, storage of specimens in two walk-in freezers and large preserved-storage tanks, photographic and X-ray darkrooms, a research library, a large seminar room and combination offices and laboratories that adjoin, but are separate self-contained units.

Good progress also was made on the Shellfish Research Center in Milford, Conn., which will be used for basic research on the physiology and ecology of commercial shellfish and methods for artificial culture of shellfish.

Improvements were made in 1965 to existing installations. A dock and float were completed at the Bureau's Biological Laboratory at Auke Bay, Alaska. The facility is capable of handling 100-foot vessels as well as the Laboratory's complement of small work boats. Daily tidal fluctuations are as much as 25 feet. The sea-water system at the Laboratory was also completed with installation of a dual system of submerged automatic electrical pumps that deliver salt water from the Bay to a storage tank on the roof 75 feet above high tide. This system provides a constant supply of sea water to experimental tanks and aquariums in the Laboratory.

The vessel construction program also made good progress, with one exception. In May 1965, conversion of the *Undaunted,* a 143-foot ATA class Navy tug, into a fishery-oceanography research vessel, was completed. The vessel is equipped with wet and dry laboratories, oceanographic and trawl winches, an in situ salinity/temperature/depth system, circulating water bait tank, radar, loran, and Simrad sonar. The cruising speed is 10 to 12 knots with a range of about 9,500 nautical miles. With a crew of 15, the *Undaunted* can accommodate a scientific party of 10 to 12 persons. The vessel will be based at the Bureau's Tropical Atlantic Tuna Laboratory at Miami, Fla.

The *David Starr Jordan,* the other vessel completed in 1965, is the United States' latest and most modern fishery research vessel. A large part of this $2-million replacement of the *Black Douglas* is devoted to laboratories for biological research and chemical and physical oceanography. Other facilities are a scientific information center and a data processing room for quickly handling the vast amount of data that must be recorded and correlated during a cruise. Other special features include a bow thruster, underwater observation windows, and a giant Simrad research sonar. The sonar will enable scientists to survey 500 square miles of ocean a day for schooling fish. Other assets of the vessel are its ability to cruise over 12,000 miles and to remain at sea up to 40

days. The *Jordan* will be used for oceanographic research in the eastern Pacific in conjunction with the California Current Resources Laboratory and the Tuna Resources Laboratory, both at La Jolla, Calif.

A fire at the contractor's plant delayed construction of the replacement for the *Delaware*. Negotiations, however, were held concerning resumption of construction of this exploratory fishing and gear research vessel for the North Atlantic.

In 1965, two contracts for new vessels were awarded. One contract was for the M/V *Miller Freeman*, to cost $3,113,274 and to be delivered in November 1966. This vessel will provide all-season high-seas fishery and oceanographic research in conjunction with the Bureau's Biological Laboratory at Seattle, Wash.

The other contract was for constructing a replacement for the M/V *Oregon*, at a cost of $1,990,000. This vessel performs exploratory fishing and gear research for the Bureau's Exploratory Fishing Base at Pascagoula, Miss.

Excellent progress was made also in designing vessels. Design work was completed for a Great Lakes hydrobiological vessel for the Biological Laboratory at Ann Arbor, Mich.; an exploratory fishing vessel and an inshore research craft for the Alaska region; an inshore vessel for the Biological Laboratory at Boothbay Harbor, Maine; and a fishing gear research vessel to be based in Seattle, Wash.

The Bureau's principal fishery research vessels are shown in figures 9 and 10.

Publications

Publications enable the Bureau to tell the U.S. fishing industry, the general public, and the scientific community about continuing progress in its biological, chemical, economic, engineering, exploratory, marketing, and statistical activities.

Because of its numerous and varied activities, the Bureau's publications are of interest to several groups of people. Forty-eight percent of the publications concern statistics and, therefore, are of special interest to the fishing industry and fishery researchers; 15 percent are for commercial and industrial audiences; 30 percent are contributions to scientific knowledge, particularly relating to fisheries and oceanography; and the remaining 7 percent contain popular information for the general public, especially school children.

Exclusive of the 1,762 Fishery Products Reports (5,738 p.), which the 7 Market News Service field offices issued five times a

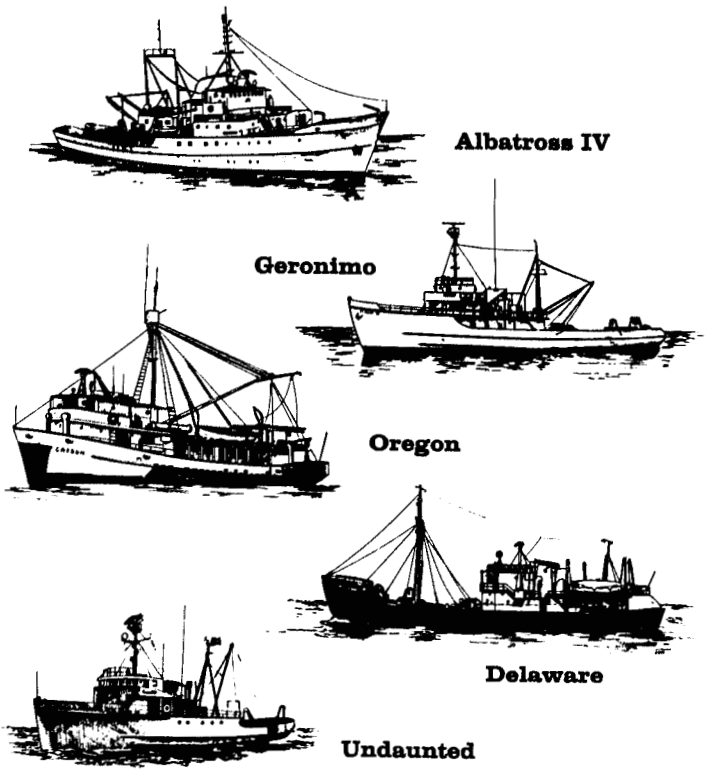

FIGURE 9.—Bureau of Commercial Fisheries principal research vessels operating in the Atlantic in 1965.

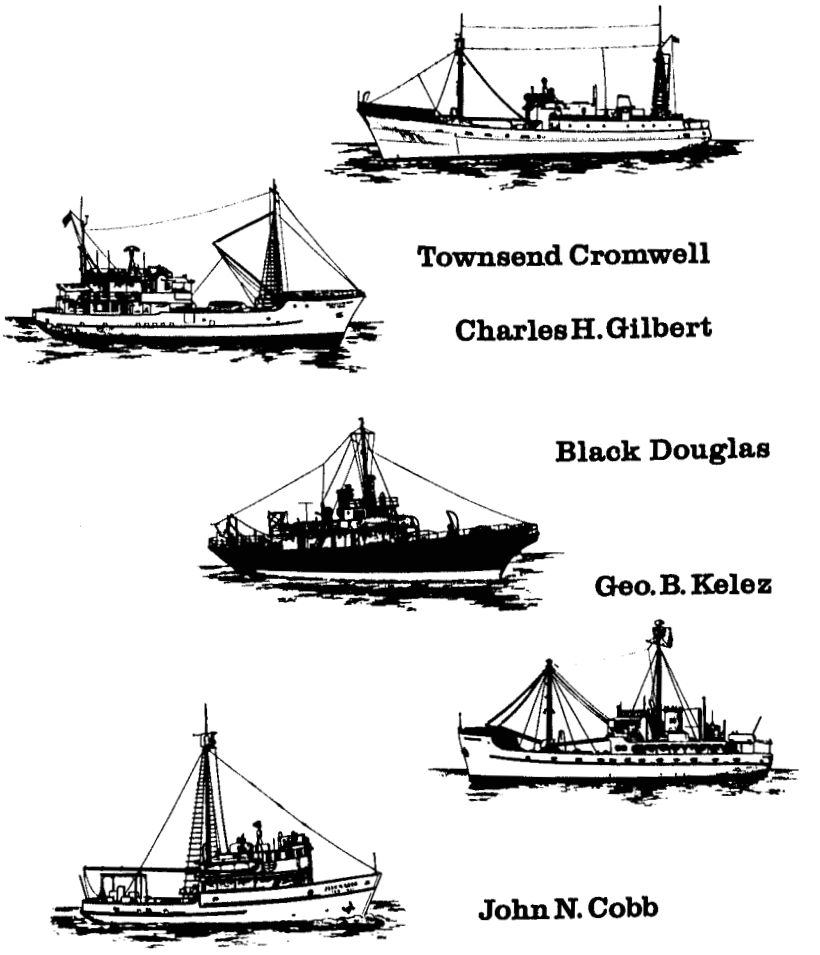

FIGURE 10.—Bureau of Commercial Fisheries principal research vessels operating in the Pacific in 1965.

week, the Bureau sponsored 878 publications (12,954 p.) in 1965. In the Fish and Wildlife Service series 497 reports (9,599 p.) were issued. The remaining 381 publications (3,355 p.) appear in non-Service technical and trade journals. Bureau employees wrote most of the publications; employees of research institutions under contract to the Bureau and unpaid collaborators wrote the others.

Appendix H of this report describes the Bureau's series of publications and partially lists the publications issued in 1965.

Appendix A—Fisheries of the United States

A-1.—*Employment, fishing craft, and establishments, calendar years 1965 and 1964*

	1965	1964
Persons employed:	*Number*	*Number*
Fishermen	(1)	127,875
In fishery wholesaling and manufacturing establishments	(1)	83,976
Total	(1)	211,851
Craft used:		
Fishing:		
Vessels (5-net tons and over)	(1)	11,808
Motor boats	(1)	60,945
Other boats	(1)	3,659
Total	(1)	76,412
Fishing vessels, documentations issued and canceled:		
First documentation	612	488
Redocumentation	51	15
Documents canceled	−422	−442
Net gain	241	61
Fishery shore establishments:		
Pacific Coast States	(1)	600
Atlantic Coast and Gulf States	(1)	2,848
Great Lakes and Mississippi River States	(1)	656
Hawaii	(1)	17
Total	(1)	4,121

[1] Not available.

A-2.—*U.S. catch of certain species, calendar years 1965, 1964, and record year*

Species	1965 [1]		1964		Record catch	
	Million pounds	*Million dollars*	*Million pounds*	*Million dollars*	*Year*	*Million pounds*
Menhaden	1,704	27	1,570	22	1962	2,348
Salmon	327	67	352	56	1936	791
Crabs: blue, king, and Dungeness	320	29	267	23	1965	320
Tuna [2]	319	42	306	39	1950	391
Shrimp	242	82	212	70	1954	268
Haddock	134	14	133	12	1929	294
Flounders, Atlantic	134	15	129	12	1965	134
Whiting	84	2	94	2	1957	133
Ocean perch, Atlantic	84	3	89	4	1951	258
Herring, sea, Atlantic	76	1	64	1	1902	201
Clams, Atlantic: surf, hard, and soft (meats)	70	16	64	15	1965	70
Jack mackerel	67	2	90	2	1952	147
Alewives, Atlantic	60	1	43	1	1908	90
Oysters (meats)	54	28	61	28	1908 [3]	152
Mullet	41	3	42	2	1902	43
Halibut, Pacific	40	9	35	6	1915	67
Herring, sea, Pacific	36	1	52	1	1937	263
Scup or porgy	36	3	39	3	1960	49
Cod, Atlantic	35	3	39	3	1880	294
Lobster, northern	29	21	31	20	1960	31
Scallops, sea (edible meats)	20	13	17	9	1961	27
Snapper, red	14	4	14	4	1902	23
Pollock	11	1	13	1	1938	41
Striped bass, Atlantic	7	1	9	1	1961	9
Mackerel, Pacific	7	(4)	27	1	1935	147
Sardines, Pacific	2	(4)	13	1	1936	1,502
Other	769	63	736	50	----------	----------
Total	4,722	451	4,541	389	----------	----------

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

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A-3.—*Summary of manufactured fishery products, by quantity and value, calendar years 1965 and 1964*

Item	1965 [1]		1964	
	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	49,508	20,200	48,554	17,457
Groundfish, including ocean perch	76,961	27,003	75,166	24,286
Halibut	9,331	5,446	9,560	4,560
Other (including whale meat for animal feeding)	[2]	[2]	39,130	13,688
Total	[2]	[2]	172,410	59,991
Breaded, raw and cooked:				
Sticks	82,282	35,701	73,574	29,986
Fillets, portions and steaks	[2]	[2]	109,416	38,373
Shellfish:				
Not breaded:				
Shrimp	[2]	[2]	98,989	89,992
Other	[2]	[2]	115,018	90,508
Total	[2]	[2]	214,007	180,500
Breaded:				
Shrimp	97,186	76,209	91,333	63,388
Other	[2]	[2]	11,994	10,182
Total	[2]	[2]	103,327	73,570
Specialties, fish and shellfish	[2]	[2]	35,758	27,946
Total fresh and frozen	[2]	[2]	708,492	410,366
Canned:				
Fish and shellfish for human consumption:				
Tuna	358,598	228,550	350,301	217,762
Salmon	176,277	120,933	180,442	95,761
Sardines:				
Maine (sea herring)	29,646	10,868	20,259	7,584
Pacific	337	69	5,438	1,030
Mackerel	31,866	5,233	48,187	6,760
Clam products and specialties	70,813	19,263	63,485	19,146
Shrimp and specialties	16,237	21,142	10,327	13,231
Oysters and specialties	11,470	6,128	11,486	7,459
Squid	11,647	1,084	10,303	887
Other	39,986	21,145	41,886	21,406
Total for human consumption	746,877	434,415	742,114	391,026
Bait and animal food:				
Animal food	378,623	48,096	352,400	43,471
Salmon eggs for bait	754	1,548	1,051	2,163
Total bait and animal food	379,377	49,644	353,451	45,634
Total canned	1,126,254	484,059	1,095,565	436,660
Cured fish and shellfish:				
Salted	[2]	[2]	37,015	16,735
Smoked	[2]	[2]	27,213	29,732
Dried fish and shellfish, and lutefisk	[2]	[2]	[3] 1,291	1,316
Total cured	[2]	[2]	65,519	47,783
Industrial products:				
Meal and scrap	506,742	35,282	470,504	28,039
Oil, body and liver	195,634	15,392	180,188	13,297
Fish solubles	196,034	5,397	186,592	5,662
Oyster shell lime and poultry grit	678,370	4,684	725,086	4,915
Marine pearl shell and mussel shell buttons	[4] 409	1,017	[4] 634	1,277
Other	----------	20,081	----------	16,721
Total industrial products	----------	81,853	----------	69,911
Grand total	----------	[2]	----------	964,720

[1] Preliminary.
[2] Data not available.
[3] Includes freeze-dried products.
[4] Number of gross.

A–4.—*Foreign trade in fishery products, by quantity and value, calendar years 1965 and 1964*

Item	1965		1964	
	Quantity	Value	Quantity	Value
Imports:				
Edible:	*Thousand pounds*	*Thousand dollars*	*Thousand pounds*	*Thousand dollars*
Fresh or frozen:				
Fresh-water (not fillets)	35,436	12,968	36,175	12,612
Salt-water (not fillets)	521,368	72,925	499,290	73,876
Groundfish and ocean perch fillets	294,954	73,934	246,569	57,548
Other fillets	74,724	30,078	73,554	26,126
Shrimp	160,287	111,277	151,168	104,355
Lobsters:				
Common	18,597	17,421	20,386	16,041
Spiny	37,814	61,280	35,104	43,547
Scallops	16,283	10,474	16,108	8,491
Other shellfish	6,220	3,415	9,209	3,199
Canned:				
Anchovies	5,593	3,900	5,507	4,131
Bonito and yellowtail	3,932	1,043	4,990	1,363
Salmon	101	80	236	128
Sardines	45,070	13,875	44,635	13,441
Tuna	50,961	20,428	54,647	23,273
Crabmeat	4,166	4,935	4,550	5,358
Lobsters	2,980	7,336	3,010	6,963
Oysters and oyster juice	8,638	3,225	7,969	2,876
Other	30,236	12,204	28,119	14,444
Cured:				
Dried, pickled, or salted:				
Cod, haddock, hake, pollock, and cusk	42,471	10,141	41,399	9,368
Herring	26,742	3,756	27,296	3,880
Other	2,290	950	3,082	1,036
Smoked or kippered	3,599	955	3,308	872
Other	2,366	796	1,788	746
Total edible	1,394,828	477,396	1,318,099	433,674
Nonedible:				
Fish and marine animal oils	[1] 11,323	6,945	[1] 10,070	7,257
Fish meal and scrap	[2] 271	30,720	[2] 439	44,181
Fish solubles	[2] 5	263	[2] 5	366
Other	----------	83,564	----------	78,765
Total nonedible	----------	121,492	----------	130,569
Grand total imports	----------	598,888	----------	564,243
Exports of domestic products:				
Edible:				
Fresh or frozen	39,700	18,593	43,780	16,223
Canned:				
Mackerel	2,174	401	8,588	1,140
Salmon	24,892	15,916	20,924	14,852
Sardines	3,376	990	3,265	729
Shrimp	4,510	4,809	3,692	3,664
Squid	11,911	1,160	7,005	662
Other	7,302	5,212	3,939	3,012
Total canned	54,165	28,488	47,413	24,059
Cured	2,579	2,227	2,015	1,118
Other	----------	----------	1,627	1,478
Total edible	96,444	49,308	94,835	42,878
Nonedible:				
Fish and marine animal oils	103,807	9,208	151,469	13,096
Other	----------	10,967	----------	8,230
Total nonedible	----------	20,175	----------	21,326
Grand total exports	----------	69,483	----------	64,204

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

Appendix B—New Legislation

College Park Laboratory Facility

Not codified

Authorizes and directs the Secretary of the Interior to convey to the State of Maryland that tract of land situated on the campus of the University of Maryland at College Park, which was heretofore donated to the United States by the State of Maryland. The conveyance is conditioned on the payment by the State of Maryland to the United States of an amount equal to the fair market value of the fixed improvements on said land.

79 Stat. 899; Public Law 89-227; Act of October 1, 1965.

Facility for International Pacific Halibut Commission

16 U.S.C. 1964 Ed., Supp. I, 772j

Authorizes the Secretary of State to provide, by contract, grant, or otherwise, facilities for office and any other necessary space for the International Pacific Halibut Commission, on or near the campus of the University of Washington in the State of Washington. An appropriation of not to exceed $500,000 was authorized.

79 Stat. 902; Public Law 89-233; Act of October 1, 1965.

Fisheries Loan Fund

16 U.S.C. 1964 Ed., Supp. I, 742c

The Act of July 24, 1965, extended to June 30, 1970, the expiring authority for the fishery loan fund as contained in section 4 of the Fish and Wildlife Act of 1956. It also altered existing law to permit loans for construction of new vessels which do not replace existing vessels in cases in which the Secretary of the Interior determines that the operation of such new vessel will not cause economic hardship to the efficient vessel operators already operating in that fishery. The statutory 3 percent minimum interest was replaced with a formula for a minimum interest rate calculated by the Secretary of the Treasury taking into consideration the average market yield on outstanding Treasury obligations of comparable maturity and such additional charges, if any, toward covering other costs of the program as the Secretary of the Interior may determine.

79 Stat. 262; Public Law 89-85; Act of July 24, 1965.

National Anadromous Fish Program

16 U.S.C. 1964 Ed., Supp. I, 757a-757f

Authorizes the Secretary of the Interior to enter into cooperative agreements with the States, jointly or severally, to conserve, develop, and enhance the anadromous fishery resources of the Nation that are subject to depletion from water resource developments or with respect to which the United

States has made international conservation agreements. Similar agreements are authorized to conserve, develop, and enhance Great Lakes fish that ascend streams to spawn. The Federal share of the cost shall not exceed 50 percent, and not more than $1 million of the funds appropriated in any one fiscal year shall be obligated in any one State. The Act authorizes an appropriation of not more than $25 million for the period ending June 30, 1970.

79 Stat. 1125; Public Law 89-304; Act of October 30, 1965.

Pesticide Research

16 U.S.C. 742d-1 Note

The Act of October 1, 1965, authorizes an increase in the appropriation for continuing studies on the effects of insecticides, herbicides, fungicides, and pesticides upon the fish and wildlife resources of the United States. The Act authorizes an appropriation of not to exceed $3.2 million for the fiscal year ending June 30, 1966, and not to exceed $5.0 million for each of the 2 fiscal years following such year.

79 Stat. 902; Public Law 89-232; Act of October 1, 1965.

Protection of U.S. Fishing Vessels on the High Seas

22 U.S.C. 1964 Ed., Supp. I, 2370(o)

As a deterrent to harassment of U.S. fishing vessels on the high seas, the Foreign Assistance Act of 1965 added a section to the provisions of existing law which contains prohibitions against furnishing assistance in certain cases. The added section provides that, except for cases governed by international agreement to which the United States is a party, in determining whether or not to furnish assistance under the Act, consideration shall be given to excluding from such assistance any country which seizes, or imposes any penalty or sanction against any U.S. fishing vessel on account of its fishing activities in international waters.

79 Stat. 660; Public Law 89-171; Act of September 6, 1965.

Appendix C—Fisheries Loan Fund

C-1.—*Status of fisheries loan fund, June 30, 1965*

Funds appropriated		$13,000,000
Principal collected	$9,995,000	
Interest collected and accrued	1,999,000	
Total collected		11,994,000
Total		24,994,000
All expenses to end of fiscal year 1965	1,937,377	
Loans approved	16,701,074	
Total		18,638,451
Balance		6,355,549

C-2.—*Cumulative totals, fiscal years 1964 and 1965, and totals, fiscal year 1965*

	Cumulative total				Total fiscal year 1965	
	As of June 30, 1964		As of June 30, 1965			
	Number	*Amount*	*Number*	*Amount*	*Number*	*Amount*
Applications received	1,487	$39,840,256	1,644	$42,734,194	157	$2,893,938
Applications approved	791	17,802,763	865	19,206,671	74	1,403,908
Applications declined	384	9,199,844	422	9,777,009	38	577,165
Applications ineligible	120	3,070,575	124	3,107,068	4	36,493
Being processed	21	1,406,700	28	758,522		

C-3.—*Cumulative totals, fiscal years 1964 and 1965, and totals, fiscal year 1965*

	Cumulative total				Total fiscal year 1965	
	As of June 30, 1964		As of June 30, 1965			
	Number	*Amount*	*Number*	*Amount*	*Number*	*Amount*
Northeast:						
Applications received	349	$10,689,425	374	$11,091,860	25	$402,435
Applications approved	183	4,805,777	195	4,948,289	12	142,512
California:						
Applications received	206	12,605,320	221	12,870,992	15	265,672
Applications approved	124	5,703,864	135	5,946,620	11	242,756
Gulf & South Atlantic:						
Applications received	334	8,353,092	349	8,565,378	15	212,286
Applications approved	125	2,875,813	130	2,950,284	5	74,471
Pacific Northwest:						
Applications received	268	4,594,549	310	5,769,641	42	1,175,092
Applications approved	161	2,628,492	182	3,168,302	21	539,810
Alaska:						
Applications received	268	2,796,511	324	3,591,264	56	794,753
Applications approved	170	1,488,029	194	1,877,388	24	389,359
Great Lakes:						
Applications received	38	408,289	42	451,989	4	43,700
Applications approved	12	93,920	13	108,920	1	15,000
Hawaii:						
Applications received	23	391,070	23	391,070	0	0
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 1965]

	Debt payment	Improvements	Other
New England and Middle Atlantic	48	51	01
South Atlantic and Gulf	66	32	2
California	41	56	3
Pacific Northwest	33	66	1
Great Lakes	28	72	0
Alaska	19	81	0
Hawaii and Puerto Rico	46	50	4
Total	43	55	02

C–5.—*Number of loan applications received monthly, fiscal years 1957–65*

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

C–6.—*Amounts applied for monthly, fiscal years 1957–65*

	1957	1958	1959	1960	1961	1962	1963	1964	1965
July		274,524	251,571	830,182	134,196	532,305	141,780	136,794	346,404
August		931,110	363,000	234,465	275,972	297,614	223,021	11,718	213,015
September		607,851	385,517	465,610	176,781	438,773	117,243	233,864	544,554
October		204,635	62,532	305,150	195,095	145,443	132,107	243,298	199,273
November		375,583	153,559	124,905	428,011	296,877	144,267	296,669	256,687
December	2,533,020	160,670	331,502	198,161	425,076	182,876	275,415	350,103	265,783
January	377,485	520,323	153,501	344,197	203,752	907,519	68,100	1,087,030	272,845
February	1,458,748	305,318	115,000	554,425	665,798	195,612	111,670	1,001,800	48,970
March	2,563,703	862,325	185,069	698,063	692,766	390,959	119,470	194,515	138,085
April	629,131	336,888	189,871	226,542	426,453	321,438	102,661	830,592	124,500
May	2,276,774	642,025	185,869	1,003,874	877,990	86,911	23,000	569,175	247,057
June	948,437	224,652	291,980	343,372	216,160	202,927	132,444	285,097	236,165
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

Appendix D—American Fisheries Advisory Committee Membership, 1965

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

Chairman: STANLEY A. CAIN, *Assistant Secretary of the Interior for Fish and Wildlife and Parks*

Harry Heber Bell
Harry H. Bell and Sons, Inc.,
2001 Pass-a-Grille Way,
St. Petersburg Beach, Fla. 33700

George J. Davidson
Boat Service Corp.,
Room #1, Administration Building,
Fish Pier,
Boston, Mass. 02100

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

J. Roy Duggan, President
King Shrimp Co., Inc.,
P. O. Box 899,
Brunswick, Ga. 31421

Ammon G. Dunton
Dunton, McLeod & Simmons,
White Stone, Va. 32578

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

Ray H. Full, President
Kishman Fish Co.,
Vermilion, Ohio 44089

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

E. Robert Kinney, President
Gorton's of Gloucester, Inc.,
327 Main Street,
Gloucester, Mass. 01931

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

John S. McGowan, President
Bumble Bee Seafoods, Inc.,
Box 60,
Astoria, Oreg. 97103

John Mehos
Liberty Fish and Oyster Co.,
P. O. Box 267,
Galveston, Tex. 77550

Anthony Nizetich
Director of Government and
Industry Relations,
Star Kist Foods, Inc.,
Terminal Island, Calif. 93465

Einar Pedersen
8801 Golden Gardens Drive, N.W.,
Seattle, Wash. 98107

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

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

Theodore H. Shepard, Jr.
Schulman-Shepard Co.,
312 Cigali Building,
107 Camp Street,
New Orleans, La. 70100

Daniel H. Smith
Smith Brothers of Port Washington,
100 North Franklin Street,
P. O. Box 246,
Port Washington, Wis. 53074

W. O. Smith
3104 Tongass Avenue,
Ketchikan, Alaska 99501

Robert D. Balkovic, Executive Secretary
Bureau of Commercial Fisheries

Appendix E—Organizations With Which the Bureau Had Research and Development Contracts and Grants in 1965

Organization	*Location*
Alabama, University of	University, Ala.
Alaska Department of Fish and Game	Juneau, Alaska
Alaska, University of	College, Alaska
American Scientific Corp.	Alexandria, Va.
Bears Bluff Laboratories Inc.	Wadmalaw Island, S.C.
Biological Dynamics, Inc.	Cambridge, Mass.
California Academy of Sciences	San Francisco, Calif.
California Department of Fish and Game	Sacramento, Calif.
California Marine Research Committee	Sacramento, Calif.
California, University of	Berkeley, Calif.
Columbia University	New York, N.Y.
Cornell University	Ithaca, N.Y.
Delaware, University of	Newark, Del.
Duke University	Durham, N.C.
Florida State University	Tallahassee, Fla.
Florida, University of	Gainesville, Fla.
Gulf Coast Research Laboratory	Ocean Springs, Miss.
Harvard University	Cambridge, Mass.
Hawaii, University of	Honolulu, Hawaii
Hiram College	Hiram, Ohio
Idaho, University of	Moscow, Idaho
Illinois Department of Conservation	Springfield, Ill.
Ionics, Inc.	Cambridge, Mass.
Iowa State University	Ames, Iowa
Johns Hopkins University	Baltimore, Md.
Louisiana, University of Southwestern	Lafayette, La.
Maryland, University of	College Park, Md.
Massachusetts Institute of Technology	Cambridge, Mass.
Massachusetts, University of	Amherst, Mass.
Miami, University of	Coral Gables, Fla.
Michigan State University	East Lansing, Mich.
Michigan, University of	Ann Arbor, Mich.
Minnesota, University of	Minneapolis, Minn.
Mission Bay Research Foundation	Los Angeles, Calif.
Mt. Auburn Research Associates	Cambridge, Mass.
National Academy of Sciences	Washington, D.C.
National Fisheries Institute	Washington, D.C.
North Carolina, University of	Chapel Hill, N.C.
Oregon Game Commission	Portland, Oreg.
Oregon State Fish Commission	Portland, Oreg.
Oregon State University	Corvallis, Oreg.
Puerto Rico, University of	Mayaguez, P.R.
Rhode Island, University of	Kingston, R.I.
Rutgers University	New Brunswick, N.J.
San Jose State College	San Jose, Calif.
Scripps Institution of Oceanography	La Jolla, Calif.
South Florida, University of	Tampa, Fla.
Straza Industries	El Cajon, Calif.

Texas, University of	Austin, Tex.
Trenton Junior College	Trenton, N.J.
Tufts University	Medford, Mass.
Virginia Polytechnic Institute	Blacksburg, Va.
Washington State Department of Fisheries	Olympia, Wash.
Washington, University of	Seattle, Wash.
Windmill Point Oyster Co.	Irvington, Va.
Wisconsin, University of	Madison, Wis.
Woods Hole Oceanographic Institution	Woods Hole, Mass.

Appendix F—Budget for Fiscal Year 1965

Function	Appropriations								Other funds		Total
	Management and investigations of resources	Special foreign currency program	Construction	Construction of fishing vessels	General administrative expenses	Administration of Pribilof Islands	Payment to Alaska from Pribilof Islands receipts	Fishery promotion and development [1]	Contributed funds	Reimbursements	
	Thousand dollars	*Thousand dollars*	*Thousand dollars*	*Thousand dollars*	*Thousand dollars*	*Thousand dollars*	*Thousand dollars*	*Thousand dollars*	*Thousand dollars*	*Thousand dollars*	*Thousand dollars*
Management	463										463
Marketing and technology	4,825	125						2,119	668	533	8,270
Research	11,805	175						2,426	846	483	15,735
Research on fish migration over dams	1,425							250		113	1,788
Fishing vessel mortage insurance	44										44
Columbia River fishery facilities	2,271		1,584							141	3,996
Fishery resources disaster aid	400										400
Construction of fishery facilities			4,329								4,329
Construction of fishing vessels				2,500							2,500
General administrative services					704			410	40	8	1,162
Administration of Pribilof Islands						2,172				35	2,207
Fur seal research						282				3	285
Payment to Alaska from Pribilof Islands receipts							964				964
Fisheries Advisory Committee								37			37
Total	21,233	300	5,913	2,500	704	2,454	964	5,242	[2] 1,554	[3] 1,316	42,180

[1] Funds made available under Public Law 466, 83d Cong. (known as the Saltonstall–Kennedy Act of 1954).

[2] Includes $777,000 from Great Lakes Fishery Commission and $633,000 for inspection and grading fishery products.

[3] Reimbursements include funds from the following: $618,000 AEC; $389,000 Bureau of Sport Fisheries and Wildlife; $104,000 Corps of Engineers; $86,000 CIA; $33,000 State of Washington; $35,000 Japan and Canada.

Appendix G—Physical Properties

G-1.—*Principal laboratories and installations, calendar year 1965*

Location	Type	Principal use	Gross valuation [1]
Alaska:			
Auke Bay	Biological Laboratory	Biological research	$436,000
Juneau	Exploratory Fishing and Gear Research Base, warehouse and shops.	Exploratory fishing and gear research, vessel maintenance, loans and grants.	[2] 145,000
Ketchikan	Technological Laboratory	Technological research	195,000
Pribilof Islands	Fur seal processing facilities and native villages.	Management of Alaska fur seals.	2,912,000
California:			
La Jolla	Biological Laboratory	Biological research	[2] 2,600,000
San Diego	do	do	([3])
Stanford	do	do	([3])
Connecticut, Milford	do	do	92,000
District of Columbia:			
Navy Yard Annex	do	do	([3])
U.S. National Museum	Ichthyological Laboratory	do	([3])
Florida:			
Gulf Breeze	Biological Laboratory	do	62,000
St. Petersburg Beach	Office of Loans and Grants	Loans and grants	([3])
Georgia, Brunswick	Biological Laboratory	Biological research	([3])
Hawaii, Honolulu	do	Biological research, loans and grants, statistics.	315,000
Maine, Boothbay Harbor	do	Biological research	[2] 211,000
Maryland:			
College Park	Technological Laboratory	Technological research, home economics.	84,000
Oxford	Biological Laboratory	Biological research, statistics	207,000
Massachusetts:			
Boston	Office of Loans and Grants	Loans and grants	([3])
Gloucester	Technological Laboratory	Technological research, fishery products inspection.	334,000
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 Station, Exploratory Fishing and Gear Research Station.	Biological and technological research, exploratory fishing and gear research, marketing development, statistics.	([3])
Mississippi, Pascagoula	Exploratory Fishing and Gear Research Base, Technological Laboratory.	Exploratory fishing and gear research, market development, biological and technological research.	370,000
North Carolina, Beaufort	Biological Laboratory	Biological research, statistics	595,000
Texas, Galveston	do	Biological research	351,000
Washington, Seattle	Biological Laboratories, Technological Laboratory, Exploratory Fishing and Gear Research Base, dock and warehouse.	Biological and technological research, exploratory fishing and gear research, Pribilof Islands supply, fishery products inspection.	[2] 2,142,000
Puerto Rico, Mayaguez	Technological Laboratory	On loan to University of Puerto Rico.	

[1] Figures shown are original acquisition or construction costs.
[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.

G–2.—*Minor field research stations, market news offices, exploratory fishing stations, market development offices, and statistical offices, calendar year 1965*

Location	Type	Principal use	Gross valuation [1]
Alabama, Bayou LaBatre	Statistical Field Office	Statistics reporting	(2)
Alaska:			
Brooks Lake	Field Research Station	Biological research	$44,000
Juneau	Statistical Field Office	Statistics	(3)
Karluk 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
California:			
Los Angeles	Inspection Office	Inspection	(2)
San Pedro	Market News and Statistics Office.	Market news and statistics reporting.	(2)
San Francisco	Marketing and Inspection Office.	Marketing, inspection	(2)
Terminal Island	Marketing Office and Technological Station.	Technological research, fishery products inspection.	(2)
Tiburon	Field Research Station	Biological research	(2)
Florida:			
Apalachicola	Statistical Field Office	Statistics reporting	(2)
Fort Myers	do	do	(2)
Green Cove Springs	Field Research Station	Biological research	(2)
Key West	Statistical Field Office	Statistics reporting	(2)
Miami	do	Statistics and biological research.	(2)
Panama City	Exploratory Fishing and Gear Research Station.	Exploratory fishing and gear research.	(2)
St. Petersburg Beach	Field Research Station, Inspection Office, and Marketing.	Biological research, fishery products inspection, marketing.	(2)
Tampa	Statistical Field Office	Statistics reporting	(2)
Georgia:			
Atlanta	Marketing Office	Marketing	(2)
Brunswick	Statistical Field Office	Statistics	(2)
St. Simons Island	Exploratory Fishing and Gear Research Station.	Exploratory fishing and gear research.	(2)
Hawaii, Honolulu	Statistical Office	Statistics	(2)
Idaho:			
Boise	Field Research Station	Biological research	(2)
Weiser	do	do	(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	(2)
Houma	do	Statistics reporting	(2)
Morgan City	do	do	(2)
New Orleans	Market News Office, Statistical Field Office.	do	(2)
Maine:			
Portland	Field Office	Statistics, market news, biological research.	(2)
Rockland	do	do	(2)
West Boothbay Harbor	Statistical Field Office	Statistics	(2)
Maryland:			
Baltimore	Market News Office, Marketing.	Market news reporting, marketing.	(2)
Salisbury	Statistical Field Office	Statistics	(2)
Massachusetts:			
Boston	Market News Office, Marketing.	Market news reporting, statistics, biological and technological research, marketing.	(2)
Gloucester	Field Offices	Statistics, biological research, fishery products inspection.	(2)
New Bedford	Field Office	Statistics, biological research, market news reporting.	(2)
Provincetown	Statistical Field Office	Statistics, market news reporting.	(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 1965*—Continued

Location	Type	Principal use	Gross valuation [1]
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 and market news reporting.	(2)
Pascagoula	Field Research Station	Biological research, marketing.	(2)
Missouri, St. Louis	Marketing Office	Marketing	(2)
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 Office	Marketing	(2)
Sandusky	Field Research Station	Biological research	(2)
Oregon:			
Eugene	do	do	(2)
Portland	do	do	(2)
Rhode Island:			
Point Judith	Field Station	Statistics, biological research	(2)
Warren	Statistical Field Office	Statistics	(2)
South Carolina, Charleston	do	do	(2)
Tennessee, Camden	Statistical Office	do	(2)
Texas:			
Aransas Pass	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	do	do	(2)
Port Arthur	do	do	(2)
Port Isabel	do	do	(2)
Virginia:			
Franklin City	Field Research Station	Biological research	(2)
Hampton	Market News Office	Market news reporting	(2)
Norfolk	Statistical Field Office	Statistics	(2)
Weems	do	do	(2)
Washington:			
North Bonneville	Field Research Station	Biological research	(2)
Seattle	Market News, Statistical, and Inspection Office.	Market news reporting, statistics, loans and grants.	(2)
Do	Marketing Office	Marketing	(2)
Wisconsin:			
Ashland	Field Research Station	Biological research	(2)

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

G-3.—*Bureau of Commercial Fisheries vessel fleet, calendar year 1965*

Name of vessel	Home port	Length (feet)	Year built	Cost or estimated value	Horsepower	Mission
Pribilof	Seattle, Wash	222	1954	$2,200,000	1,500	Transportation of supplies and personnel to the Pribilof Islands fur seal stations.
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	805,000	1,000	High-seas salmon investigation and oceanography.
David Starr Jordan.	San Diego, Calif.	171	1965	2,000,000	900	Oceanography; sardine ecology; studies on biology of other commercial species.
Townsend Cromwell.	Honolulu, Hawaii	158	1963	1,049,935	800	Pacific oceanography; tuna biology, behavior, and distribution.
Black Douglas	San Diego, Calif.	152	1926	75,000	325	Biology, distribution, spawning of the Pacific sardine; abundance and life history studies of other commercial species.
Delaware	Gloucester, Mass.	147	1937	302,473	735	Exploratory fishing and biological studies on the groundfishes and sea scallops, gear research.
Geronimo	Washington, D.C.	143	1944	1,000,000	1,850	Fishery oceanographic research.
Undaunted	Miami, Fla	143	1944	1,000,000	1,850	Investigations of tropical Atlantic.
Charles H. Gilbert.	Honolulu, Hawaii	123	1952	409,890	640	Pacific oceanography; tuna biology, behavior, and distribution.
Oregon	Pascagoula, Miss.	100	1950	300,000	600	Exploratory fishing for shrimp, tuna, and other potentially commercial species; gear research.
John N. Cobb	Seattle, Wash	93	1950	235,392	500	Exploratory fishing for pelagic and bottom fish, 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	181,600	320	Bottom surveys for halibut; patrol work; observations on foreign fishing activities in Bering Sea.
Geo. M. Bowers	Panama City, Fla.	73	1956	93,800	210	Primarily gear research.
Kaho	Saugatuck, Mich	65	1961	85,000	------	Exploratory fishing and gear research on industrial fishes, chubs, alewives, sheepshead, gizzard shad, and smelt.
Rorqual	Gloucester, Mass.	64	1941	187,000	230	Gear research and inshore exploration on herring and shellfish.
T-19	South Carolina	64	1942	187,000	------	On loan to State of South Carolina.
Cisco	Saugatuck, Mich.	60	1950	85,000	175	Research on deepwater fish species, their distribution, abundance, and ecology; limnology.
Heron	Juneau, Alaska	58	1940	19,000	135	Salmon and herring research.
Musky II	Sandusky, Ohio	53	1931	3,666	170	Studies on warm-water fishes of Lake Erie; limnology; pollution studies.
Siscowet	Ashland, Wis	52	1946	81,000	170	Research on deepwater fish species, their distribution, abundance, and ecology; limnology.
Shang Wheeler	Milford, Conn	50	1951	45,840	140	Shellfish research; oyster and clam propagation; predator control.
Alosa	Oxford, Md	48	1941	6,500	82	Shellfish research; oyster propagation and disease studies.

G-3.—*Bureau of Commercial Fisheries vessel fleet, calendar year 1965*—Continued

Name of vessel	Home port	Length (feet)	Year built	Cost or estimated value	Horse-power	Mission
Hiodon	Mobridge, S. Dak.	46	1965	24,156	190	Research on reservoir fish species.
J-3486	North Carolina	43	1942	28,000	.....	On loan to State of North Carolina.
Kingfish	St. Petersburg Beach, Fla.	43	1954	24,500	150	Estuarine investigations.
J-1110	Beaufort, N.C	40	1934	15,000	200	Research on shellfish, striped bass, and other coastal species; collection of samples for radiobiological studies.
Phalarope II	Boothbay Harbor, Maine.	40	1932	8,000	225	Clam and herring studies.
Sockeye	King Salmon, Alaska.	40	1946	11,250	175	Salmon research work.

Appendix H—Fish and Wildlife Service Publication Series and a 1965 List of Publications by Bureau Personnel

The regular, established series of the Fish and Wildlife Service in which Bureau of Commercial Fisheries 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 with volume 63 in which papers are bound together in a single issue of the bulletin instead of being issued individually. Volume 65, no. 1 (309 p.) was issued in 1965. Some bulletins are for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402; they are distributed free to libraries and to a limited number of scientific cooperators.

Fishery Industrial Research.—Technical reports dealing with scientific investigations of fishery technology, economics, exploratory fishing, and gear research. Volume 2, no. 4, and vol. 3, no. 1 (119 p.) were published in 1965. They are distributed free to libraries and to a limited number of scientific cooperators.

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. Thirty-one of these reports (2,196 p.) were published in 1965. They are distributed free to libraries and cooperators on a limited mailing list.

Fishery Leaflet.—Popular information on fishery subjects intended primarily for use in correspondence. Eight leaflets (98 p.) were published in 1965. They are distributed free on request.

Circular.—Popular and semitechnical publications of general and regional interest intended to aid conservation and management. Nineteen circulars (661 p.) were published in 1965. They have free, but limited distribution.

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 microfiches, each of which has up to 40 pages of material. In June 1965, the Bureau began using the 4- by 6-inch size of microfiche which holds up to 70 pages. The pages are reduced to 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 microfiche series to be used for primary publication of scientific reports. Advantages of microfiche over regular size reports are three-fold. 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 8 and 9 (5 microfiches, 228 p.) were issued in 1965. 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.]

Fishery and Oceanography Translations.—Subject-indexed lists of translations that are available to fishery scientists and oceanographers; translations that are in progress; translated tables of contents of important foreign and oceanographic journals; and abstracts of pertinent foreign scientific literature. Numbers 4, 5, and 6 (143 p.) were issued in 1965. Limited distribution is made to laboratories, libraries, State fishery agencies, research institutions, and research scientists.

Commercial Fisheries Abstracts.—A monthly abstract of world literature (chiefly English language) on fishery technology. Volume 18 in 1965 had 12 issues (346 p.). They have free, but limited distribution.

Commercial Fisheries Review.—A monthly periodical which features articles on Bureau research and operations and trends and developments in the domestic and foreign fisheries. Volume 27 in 1965 had 12 issues (1,520 p.). They are for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Subscription price $6.50 a year; $2 additional for foreign mailing; single copies 60 cents each. Index for volume 25 (1963) of the Commercial Fisheries Review was issued also (69 p.).

Statistical Digest.—Annual statistics with detailed tabulations relating to fishery production, manufacture, and commerce. These succeeded the Administrative Report series. One digest (524 p.) was published in 1965. 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 foreign trade; issued monthly, quarterly, or annually by States, regions or larger units. In 1965 there were 221 monthly landings reports (996 p.) for 19 States; 28 monthly and quarterly reports of manufactured products (132 p.); and 48 annual reports of State and sectional summaries of operating units, catch, manufacture, and foreign trade (656 p.). These reports are sent to private and Government industries in the United States, foreign industries, and United States embassies.

Fishery Products Report.—Daily (5 times a week), monthly and annual data on landings, receipts, supplies, prices, imports, movements of fish and fish products in local areas; market conditions; and fishery developments in the United States and foreign countries. Special Market News data reports also are issued sporadically. Seven Market News Service field offices prepare and mail these free reports. During 1965 the 1,762 daily reports totaled 5,738 pages; the 79 monthly reports, 1,020 pages, the 8 annual reports, 323 pages; and the 8 supplementary reports, 100 pages.

Test Kitchen Series.—Information on buying, preparing, and cooking fish, with tested recipes for institutions, home economists, and housewives. This series is used to promote the use of fish. Two (43 p.) were issued in 1965. They are distributed free by the U.S. Fish and Wildlife Service.

Miscellaneous paper.—One miscellaneous paper, totaling 115 pages, was issued in 1965. It was distributed to Bureau laboratories and personnel and the Library of Congress.

A detailed list of publications of the Bureau of Commercial Fisheries and its personnel or contractors or collaborators during 1965 follows. The articles are listed by authors.

Publications [1]

AHLSTROM, ELBERT H.

A review of the effects of the environment of the Pacific sardine. Int. Comm. Northwest Atl. Fish., Spec. Publ. 6: 53–74.

Kinds and abundance of fishes in the California Current region based on egg and larval surveys. Calif. Coop. Oceanic Fish. Invest. Rep. 10: 31–52.

ALDRICH, DAVID V.

Observations on the ecology and life cycle of *Prochristianella penaei* Kruse (Cestoda: Trypanorhyncha). J. Parasitol. 51(3): 370–376.

ALLEN, HAROLD B.

The botulism problem in seafoods. Proc. Gulf Carib. Fish. Inst., 17th Annu. Sess.: 32–36.

ALVERSON, DAYTON L., AND EDWARD A. SCHAEFERS.

Ocean engineering—its application to the harvest of living resources. Ocean Sci. Ocean Eng., 1965, 1: 158–170. Trans. Joint Conf., Mar. Technol. Soc. and Amer. Soc. Limnol. Oceanogr., Wash., D.C., June 1965.

ANDERSON, MARGARET L., MAYNARD A. STEINBERG, AND FREDERICK J. KING.

Some physical effects of freezing fish muscle and their relation to protein-fatty acid interaction. *In* Rudolf Kreuzer (editor), The technology of fish utilization, p. 105–110. Fishing News (Books) Ltd., London.

ANDERSON, WILLIAM D., JR., AND ELMER J. GUTHERZ.

New Atlantic Coast ranges for fishes. Quart. J. Fla. Acad. Sci. 27(4): 299–306.

ANDERSON, WILLIAM W., AND JACK W. GEHRINGER.

Biological-statistical census of the species entering fisheries in the Cape Canaveral Area. U.S. Fish Wildl. Serv., Spec. Sci. Rep. Fish. 514, x + 79 p.

ANDERSON, WILLIAM W., AND G. ROBERT LUNZ.

Southern shrimp . . . a valuable regional resource. Atl. States Mar. Fish. Comm., Mar. Resourc. Atl. Coast, Leafl. 4, 6 p.

ANTHONY, VAUGHN C., AND JEAN CHENOWETH.

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[1] This list does not include Commercial Fisheries Abstracts, Current Fishery Statistics, and Commercial Fisheries Review, except a few articles for which the authors' names are given.

APPLEGATE, VERNON C., AND M.L.H. THOMAS.

Sex ratios and sexual dimorphism among recently transformed sea lampreys, *Petromyzon marinus* Linnaeus. J. Fish. Res. Bd. Can. 22(3): 695–711.

ARON, W., E. H. AHLSTROM, B. McK. BARY, A. W. H. BÉ, AND W. D. CLARKE.

Towing characteristics of plankton sampling gear. Limnol. Oceanogr. 10(3): 333–340.

ASTRAHANTSEFF, SERGEI, AND MILES S. ALTON.

Bathymetric distribution of brittlestars (Ophiuroidea) collected off the northern Oregon Coast. J. Fish. Res. Bd. Can. 22(6): 1407–1424.

AUSTIN, THOMAS S.

Atlantic Ocean. *In* Daniel N. Paledes (editor), McGraw-Hill yearbook of science and technology, p. 113–116. McGraw-Hill Book Company, New York.

BAILEY, MERRYLL M.

Lake trout fin-clipping rates at two national fish hatcheries. Progr. Fish-Cult. 27(3): 169–170.

BAKER, EMMETT B., AND ARTHUR S. MERRILL.

An observation of *Laevicardium mortoni* actually swimming. The Nautilus 78(3): 104.

BALKOVIC, ROBERT, LOYAL G. BOUCHARD, JOHN CRUM, J. BRUCE KIMSEY, CHARLES LEE, AND WM. ELLIS RIPLEY.

U.S. survey team reports on potential of commercial fishery [Brazil]. Com. Fish. Rev. 27(3): 68–70.

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List of primary receivers of imported fishery products and byproducts at Houston, Tex., 1965. U.S. Fish Wildl. Serv., Bur. Com. Fish., New Orleans Market News Serv., 3 p.

List of primary receivers of imported fishery products and byproducts at Mobile, Ala., 1965. U.S. Fish Wildl. Serv., Bur. Com. Fish., New Orleans Market News Serv., 2 p.

BEETON, ALFRED M.

Eutrophication of the St. Lawrence Great Lakes. Limnol. Oceanogr. 10(2): 240–254.

BEETON, A. M., J. F. CARR, AND J. K. HILTUNEN.

Sampling efficiencies of three kinds of dredges in southern Lake Michigan. [Abstract.] *In* Proc. 8th Conf. Great Lakes Res., p. 209. Univ. Mich., Inst. Sci. Technol., Great Lakes Res. Div., Publ. 13.

BERRY, FREDERICK H.

African pompano *Alectis crinitus*. *In* A. J. McClane (editor), McClane's Stand. Fish. Encyl. Int. Angling Guide, p. 1–2. Holt, Rinehart and Winston, New York, Chicago, and San Francisco.

Almaco jack *Seriola rivoliana*. *In* A. J. McClane (editor), McClane's Stand. Fish. Encyl. Int. Angling Guide, p. 16–17. Holt, Rinehart and Winston, New York, Chicago, and San Francisco.

Amberjacks. *In* A. J. McClane (editor), McClane's Stand. Fish. Encyl. Int. Angling Guide, p. 17. Holt, Rinehart and Winston, New York, Chicago, and San Francisco.

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Atlantic horse-eye jack *Caranx latus*. *In* A. J. McClane (editor), McClane's Stand. Fish. Encyl. Int. Angling Guide, p. 59–60. Holt, Rinehart and Winston, New York, Chicago, and San Francisco.

Atlantic permit *Trachinotus falcatus*. *In* A. J. McClane (editor), McClane's Stand. Fish. Encyl. Int. Angling Guide, p. 61–62. Holt, Rinehart and Winston, New York, Chicago, and San Francisco.

Banded rudderfish *Seriola zonata*. *In* A. J. McClane (editor), McClane's Stand. Fish. Encyl. Int. Angling Guide, p. 93–94. Holt, Rinehart and Winston, New York, Chicago, and San Francisco.

Bar jack *Caranx ruber*. *In* A. J. McClane (editor), McClane's Stand. Fish. Encyl. Int. Angling Guide, p. 95. Holt, Rinehart and Winston, New York, Chicago, and San Francisco.

Bigeye scad *Selar crumenophthalmus*. *In* A. J. McClane (editor), McClane's Stand. Fish. Encyl. Int. Angling Guide, p. 106–107. Holt, Rinehart and Winston, New York, Chicago, and San Francisco.

Black jack *Caranx lugubris*. *In* A. J. McClane (editor), McClane's Stand. Fish. Encyl. Int. Angling Guide, p. 114–115. Holt, Rinehart and Winston, New York, Chicago, and San Francisco.

Blue runner *Caranx crysos*. *In* A. J. McClane (editor), McClane's Stand. Fish. Encyl. Int. Angling Guide, p. 134–135. Holt, Rinehart and Winston, New York, Chicago, and San Francisco.

California yellowtail *Seriola dorsalis*. *In* A. J. McClane (editor), McClane's Stand. Fish. Encyl. Int. Angling Guide, p. 168–169. Holt, Rinehart and Winston, New York, Chicago, and San Francisco.

Carangidie. *In* A. J. McClane (editor), McClane's Stand. Fish. Encyl. Int. Angling Guide, p. 170–171. Holt, Rinehart and Winston, New York, Chicago, and San Francisco.

Crevalle *Caranx hippos*. *In* A. J. McClane (editor), McClane's Stand. Fish. Encyl. Int. Angling guide, p. 203–204. Holt, Rinehart and Winston, New York, Chicago, and San Francisco.

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Dorade *Gnathanodon speciosus*. *In* A. J. McClane (editor), McClane's Stand. Fish. Encyl. Int. Angling Guide, p. 218–219. Holt, Rinehart and Winston, New York, Chicago, and San Francisco.

Greater amberjack *Seriola dumerili*. *In* A. J. McClane (editor), McClane's Stand. Fish. Encyl. Int. Angling Guide, p. 386–387. Holt, Rinehart and Winston, New York, Chicago, and San Francisco.

Green jack *Caranx caballus*. *In* A. J. McClane (editor), McClane's Stand. Fish. Encyl. Int. Angling Guide, p. 388–389. Holt, Rinehart and Winston, New York, Chicago, and San Francisco.

Jacks. *In* A. J. McClane (editor), McClane's Stand. Fish. Encyl. Int. Angling Guide, p. 436. Holt, Rinehart and Winston, New York, Chicago, and San Francisco.

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