U. S. DEPARTMENT OF COMMERCE

BUREAU OF FISHERIES

U. S. Bureau of Commercial Fisheries

REPORT

OF THE

UNITED STATES COMMISSIONER OF FISHERIES

FOR THE FISCAL YEAR 1934

WITH

APPENDIXES

FRANK T. BELL
Commissioner

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National Oceanic and Atmospheric Administration

Report of the United States Commissioner of Fisheries

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NOTE

The first section of this volume, entitled "Bureau of Fisheries", constitutes what was known in years prior to 1933 as "Report of the Commissioner of Fisheries." Since then, in the interests of economy, it is a reprint from the "Annual Report of the Secretary of Commerce." The pagination, therefore, is the same as that of the Secretary's Report, rather than beginning with page I.

ERRATA

Page 58: The catch of lobsters in Connecticut should be *598,809 pounds* instead of *589,809 pounds*.

Page 108: First section of table at top of page, *Sea robin* should be *Sea bass* and *Tautog* should be *Swordfish*.

Page 188: In the table "Catch off Latin America" the Total and Grand total under "Lines, set and hand" should be *15,707,777* pounds instead of *5,707,777* pounds.

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[Reprinted from the Annual Report of the Secretary of Commerce, 1934]

BUREAU OF FISHERIES

The fishing industry, in common with most other industries, has suffered severely during the past few years. The fiscal year 1934 has shown, at least in many of the important producing centers, a tendency toward recovery. Better prices have prevailed during most of the months of the year, and these better prices have been accompanied by increased catches. While still far below normal, the upward trend is very encouraging.

The fisheries of the United States and Alaska, which are prosecuted on the high seas and in the territorial waters of the Atlantic and Pacific Oceans and in the Gulf of Mexico and their adjacent waters, as well as in the Great Lakes and in interior waters in 1932, the latest calendar year for which complete data are available, gave employment to about 116,000 persons as commercial fishermen, and their catch in the same year aggregated 2,614,000,000 pounds, valued at $54,800,000 to the fishermen, representing a decrease of 1 percent in quantity and 29 percent in value as compared with the catch and its value in the preceding year.

There were decreases in most of the groups of prepared products; thus the output of canned fishery products which amounted to 416,062,000 pounds, valued at $43,749,000, showed a decrease of 18 percent in quantity and 31 percent in value as compared with the previous year. Byproducts valued at $12,466,000 decreased 25 percent in value, and frozen products, which amounted to 92,472,000 pounds and estimated to be valued at $7,000,000, decreased 18 percent in volume. The production of fresh and frozen packaged fish (not including shellfish) in the calendar year 1932 amounted to 51,976,000 pounds, valued at $5,741,000. Data on the output of cured fishery products were not collected for the year 1932, but in 1931 the production amounted to 98,969,000 pounds, valued at $12,364,000.

Imports of fishery products for consumption in the calendar year 1932 were valued at $29,566,000, which is 31 percent less than in the previous year, while exports of domestic fishery products were valued at $7,808,000, or 33 percent less than in 1931.

NATIONAL PLANNING COUNCIL (OF COMMERCIAL AND GAME FISH COMMISSIONERS)

For many years, in fact ever since the inception of fishery work, there has been a lack of coordination between the various organizations engaged in this service. The Federal Government and the various States have all pursued their respective ways. They have cooperated it is true, but in a sort of haphazard way, uniting on projects that concerned them both for the time being.

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This haphazard method was especially noticeable in the fish planting efforts of the various agencies and resulted in considerable wastage of fish, effort, and money. Requests for fish were received by both the State and Federal departments and were filled by the agency receiving the request, without regard to what had been done or was going to be done by the other agency concerned. The results were that often the two agencies planted different species of fish in the same waters and these different species might be antagonistic to each other. In the actual planting of these fish more time and money have been spent than necessary. The Federal Government has sent its trucks to waters that could have been better and more cheaply served by the State and vice versa.

With the advent of pollution problems, stream-survey work, and stream-improvement programs, the need for coordination of effort became even more apparent. Rivers know no State lines, nor do the fish in them. The work to be successful must embrace river systems regardless of State boundaries. This, then, would require careful planning and direction.

Commissioner Bell, therefore, called a meeting of State game and fish officials in St. Louis on April 23, 1934, and laid before them a plan to coordinate the activities of the various States and the Federal Government in all their activities concerning fish. This led to the formation of the National Planning Council of Commercial and Game Fish Commissioners. Through this council it is expected to establish unified programs that will bring about a saving in money and yet actually accomplish more for the fisheries than under the old system.

The council divided the country into five zones, grouping together those States with similar problems and conditions. Each zone will hold meetings every 3 months or oftener to consider the problems of that zone, and the whole council will meet once a year for general consideration of the whole situation.

COOPERATION WITH STATES

Many of the cooperative relationships for fish culture are a continuation of those existing in previous years. Among the newer developments is an arrangement whereby the Bureau's Northville (Mich.) station incubated trout for assignment to the States of Indiana and Ohio in conformity with the program of those States to develop trout fishing. Upon the closure of the Federal hatchery at Grand Lake Stream, Maine, the State Fish and Game Department was prevailed upon to take over its operation and allot the Bureau a limited number of land-locked salmon eggs. The resources of the State and Federal hatcheries, located at Put in Bay, Ohio, were pooled, with the result that the operations with whitefish and with pike perch were conducted at a material saving to both agencies. The State of Georgia undertook to distribute fish from the Bureau's Lake Park station, filling both State and Federal applications. At Rochester, N. Y., the cooperative arrangement with the city and the Monroe County Park Board was continued, and there was placed in operation a first-class trout hatchery, the activities of which were supervised by the Bureau, while the costs of construction were met by the local community. At Walhalla, S. C., the unified efforts of the Bureau, local sportsmen, and the authorities in charge of the Civilian Conservation Corps activities resulted in the establishment of splendid rearing ponds, in which a considerable number of trout for local waters are being grown.

The maintenance of cooperative rearing ponds by private sportsmen's organizations to be stocked with fish furnished from Federal hatcheries has been conducted on a somewhat restricted scale. The Bureau will continue to cooperate with such groups who are desirous of accepting part of the responsibility for the production of larger fish for stocking their local waters. More careful scrutiny must be given, however, to the locations available, the resources of the organization, and other pertinent details in view of the more limited scope of the Bureau's activities.

Cooperative investigations of the nutritional requirements of trout carried on jointly by the New York Conservation Department, Cornell University, and the Bureau of Fisheries at Cortland, N. Y., have been continued during the past year, and a series of monthly articles concerning modern hatchery practices has been issued for the use of fish culturists.

Cooperative trout investigations in the State of California, because of the liberal support afforded by that State, have been conducted without curtailment. Ecological studies of both coastal and high Sierran streams have been undertaken on a large scale to determine the capacity of various waters in sustaining fish life in relation to the food supply. Three stream-survey parties were maintained in the field during the past summer on Public Works Administration funds, and great progress has been made in obtaining the necessary facts upon which to base more adequate stocking policies for the waters of this State.

In the technological work of the Bureau many State agencies have cooperated in extending their facilities for the prosecution of these studies. State universities, hospitals, agricultural experiment stations, and other State institutions of research have contributed personnel and laboratories in various projects. Especially has this been true in the nutrition studies. Among the State institutions cooperating in this work are the South Carolina Food Research Commission and State Medical College, Charleston, S. C.; the Massachusetts State Agricultural College, Amherst, Mass.; the Ohio State Agricultural Experiment Station, Wooster, Ohio; the New York State College of Agriculture, Cornell University, Ithaca, N. Y.; Washington State College and Agricultural Experiment Station, Pullman, Wash.; the University of Washington, Seattle, Wash.; and the University of Maryland, College Park, Md. In addition to cooperation in nutrition investigations, the members of the staff of the Massachusetts State College rendered valuable aid to the technological staff of the Bureau's laboratory at Gloucester, Mass. In tests of fishing gear with respect to measurement of mesh size of nets, cooperation has been received from the States bordering on the Great Lakes.

In certain marketing investigations, including the studies of the grading of fish, the States of Virginia, North Carolina, Massachusetts, Maryland, and New Jersey either cooperated actively or gave valuable aid in some form.

In the annual surveys of the fisheries of the Great Lakes and Pacific Coast States such exceptional cooperation has been obtained from State fishery agencies in recent years that it has been only necessary for agents of the Bureau to conduct fragmentary surveys to supplement the data available. Recently the States of Maryland and Virginia have adopted very complete statistical programs which not only alleviate the work of our agents but also produce more accurate data.

COOPERATION WITH OTHER FEDERAL AGENCIES

The coordinating bill, passed during the last session of Congress, calls upon Government Bureaus whose activities affect wildlife, including the Bureau of Reclamation and the Bureau of Indian Affairs, to consult with the Bureau of Fisheries and/or the Bureau of Biological Survey whenever wildlife may be affected by activities of the two former organizations.

In response to this legislation, the Bureau of Reclamation of the Department of Interior has just issued general instructions to its field officers which provide that storage areas for irrigation or power shall be administered as far as possible to avoid detriment to fish and birds, and that when ponded waters are to be lowered to a point adversely affecting fish and game, officials in charge shall notify State and Federal authorities in charge of the protection of fish and game in advance.

The Bureau of Biological Survey has administered its land-purchasing program in the Upper Mississippi Refuge so as to afford assistance to the Bureau's activities. In this purchasing program the Biological Survey has endeavored to meet the wishes of the Bureau by acquiring tracts within the refuge which can be used for fish-cultural purposes. In the case of the National Park Service, aside from strictly fish-cultural work in stocking park waters, the Bureau has been requested to give further assistance by conducting a survey of the waters of the Great Smoky Mountain National Park, to develop information as to food conditions, suitability of different species, stocking policies, etc., in that area similar to the data being worked out in the western parks.

With funds received from the War Department, Corps of Engineers, to carry on the cooperative investigation at Bonneville on the Columbia River, studies are being made as to how the fish should be passed over the dam, both as mature upstream migrants and young downstream migrants. The problem is the most difficult one of its kind yet encountered since the use of devices used successfully at other dams has not been found entirely applicable at Bonneville because of the much greater height of the dam.

The Bureau also receives extremely valuable cooperation from the Engineer Corps in its studies of pollution in the Mississippi River system. In this work a floating laboratory is used, set up in a former Engineers' quarterboat. During the summer working season for several years past this boat has been moved from place to place by the Engineers' river tugs.

The Bureau of Agricultural Economics collects information on cold-storage holdings of fish in the United States. The Bureau of

Fisheries supplies that Bureau with vital economic information. In the collection of statistical data, the cooperation of the Bureau of the Census, the Bureau of Foreign and Domestic Commerce, the United States Tariff Commission, and others is of considerable value to this Bureau.

In the technological field the Bureau has worked from time to time in cooperation with practically every scientific or technical agency of the Federal Government. One example of this is the cooperation with the Navy Department in developing chemical preservatives for marine rope and cordage. Other examples are the cooperation with the Bureaus of Animal Industry, Dairy Industry, Biological Survey, Plant Industry, Food and Drug Administration, and Chemistry and Soils in extending the uses of fishery products in human, animal, and plant nutrition.

During 1933, various new and emergency agencies of the Federal Government made considerable use of the facilities of the Division of Fishery Industries, including its technical, marketing, and statistical reports and the knowledge and experience of its personnel. Such cooperation was rendered to the National Recovery Administration, the Agricultural Adjustment Administration, the Federal Emergency Relief Administration, the Federal Surplus Relief Corporation, the Reconstruction Finance Corporation, and others. Members of the Bureau's staff were detailed first to the Agricultural Adjustment Administration and later to the National Recovery Administration to supervise and assist in the formulation of fishery codes of fair competition under the National Industrial Recovery Act.

CONSERVATION OF WHALES

The Multilateral Convention for the Regulation of Whaling agreed to by the economic committee of the Council of the League of Nations on September 24, 1931, yet awaits the signature of the United Kingdom of Great Britain and Northern Ireland to make the convention effective. The convention has been ratified by the following nations: United States, July 7, 1932; Norway, July 18, 1932; Union of South Africa, January 11, 1933; Switzerland, February 16, 1933; and Mexico, March 13, 1933. In addition to these ratifications, the following have signified adherence to the convention: Nicaragua on April 30, 1932; Sudan, April 13, 1932; Monaco, June 17, 1932; Brazil, November 21, 1932; and Egypt, January 25, 1933.

LEGISLATION

Several pieces of legislation affecting fishery matters and the Bureau of Fisheries were enacted during the last session of the Seventy-third Congress. A brief statement with respect to the more important legislation enacted follows:

Public, No. 166, approved April 16, 1934, amends sections 3 and 4 of an act of Congress entitled "An act for the protection and regulation of the fisheries of Alaska", approved June 26, 1906, as amended by the act of Congress approved June 6, 1924. The effect of these amendments is to permit commercial fishing for king salmon in the

Yukon and Kuskokwim Rivers by native Indians and bona fide white inhabitants under such restrictions as may be prescribed by the Secretary of Commerce. Heretofore all commercial fishing has been prohibited in these rivers and within 500 yards of their mouths.

Public, No. 372, approved June 16, 1934, repeals all acts and parts of acts making it unlawful to kill sea lions in the waters of the Territory of Alaska, and in substance provides that sea lions may be killed in the waters of Alaska only in accordance with rules and regulations prescribed by the Secretary of Commerce. The regulations which have been promulgated pursuant to the provisions of this act provide that sea lions may be killed by natives for food or clothing, by miners or explorers when in need of food, or by anyone in the necessary protection of property, or while such animals are destroying salmon and other food fish.

Public, No. 447, approved June 21, 1934, authorizes an appropriation of $500,000 for the preparation of plans, specifications, and for the construction and equipment of a fisheries research vessel to be maintained and operated under the supervision of the Secretary of Commerce. No appropriation, however, has as yet been made.

Public, No. 464, approved June 25, 1934, authorizes the formation of associations of producers of aquatic products. This act extends to the producers of aquatic products the same privileges which have been extended to producers of agricultural products by the act of February 18, 1922 (42 Stat. 388). In other words, it permits the producers of aquatic products to form associations for the purpose of collectively producing, marketing, and harvesting aquatic products.

Public Resolution No. 19, approved April 16, 1934, extends to the whaling and fishing industries the same benefits granted under section 11 of the Merchant Marine Act of 1920, as amended. This act provides for loans for the construction, outfitting, equipment, reconditioning, remodeling, and improvement of vessels engaged in the whaling and fishing industries and is administered by the United States Shipping Board Bureau.

Public, No. 120, approved March 10, 1934, provides for the establishment of fish and game sanctuaries, subject to certain restrictions and limitations, and provides that the Secretaries of Agriculture and Commerce shall execute the provisions of the act, and authorizes them to make all needful rules and regulations for the administration of such fish and game sanctuaries or refuges as may be established pursuant to the provisions of the act.

Public, No. 121, approved March 10, 1934, commonly known as the "Federal Coordination Act", has for its purpose the conservation of wildlife—fish and game.

Public, No. 417, approved June 19, 1934, provides for loans for the purpose of financing the production, storage, handling, packing, processing, carrying, and/or orderly marketing of fish of American fisheries and/or products thereof. This act is being administered by the Reconstruction Finance Corporation.

Public, No. 381, approved June 18, 1934, authorizes production credit associations to make loans to oyster planters. This act is being administered by the Farm Credit Administration.

CONSTRUCTION ACTIVITIES

Construction and improvements at the Federal hatcheries were conducted through the medium of allotments received from the Public Works Administration and through participation in the Civil Works program during the winter. During the year there became available outright allotments totaling $281,500. These grants from the Emergency Public Works funds provided $150,000 for additional construction at five hatcheries which were only partially completed. These hatcheries, authorized by the act of May 21, 1930 (46 Stat. 371), are located in Alabama, Indiana, Pennsylvania, Texas, and West Virginia. At the close of the year all of these hatcheries had been placed on a producing basis, although several of them were not fully completed. The balance of the allotments, amounting to $131,500 was apportioned among 29 different hatcheries for the purpose of reconditioning and repairs. On the inception of the Civil Works program in November, there was approved a grant of a maximum of 2,440 men with an allotment of $85,175 for materials and expenses other than labor. These forces were assigned to projects of improvement, enlargement, and reconditioning at 40 different hatcheries, and rearing units. The maximum number of men employed at any one time was 2,269. By virtue of the outright cash allotments, and the allocation of labor, the hatchery system as regards buildings, water supply, and all physical features was brought to a higher state of repair and efficiency than has existed for a great many years.

STATISTICAL INVESTIGATIONS

FISHERIES OF THE UNITED STATES, 1932

New England States.—During the calendar year 1932 the commercial fisheries of Maine, New Hampshire, Massachusetts, Rhode Island, and Connecticut employed 16,580 fishermen. Their catch amounted to 480,521,000 pounds, valued at $14,001,000—a decrease of 10 percent in volume and 28 percent in value as compared with the catch in 1931. In addition there was a production of 229,000 bushels of seed oysters, valued at $120,000. Landings of fish by American fishing vessels at Boston and Gloucester, Mass., and Portland, Maine, amounted to 252,334,000 pounds as landed, valued at $6,084,000—a decrease of 4 percent in quantity and 34 percent in value as compared with the preceding year.

Middle Atlantic States.—The commercial fisheries of New York, New Jersey, Pennsylvania, and Delaware in 1932 gave employment to 9,155 fishermen. Their catch amounted to 141,221,000 pounds, valued at $4,654,000—a decrease of 7 percent in volume and 36 percent in value as compared with 1931. In addition, there was a production of 1,332,000 bushels of seed oysters, valued at $481,000. Landings of fish at New York City and Groton, Conn., amounted to 35,602,000 pounds or 31 percent less than in 1931. On the Hudson River the shad fishery was conducted by 274 fishermen who caught 530,000 pounds of shad valued at $51,000—an increase of 28 percent in volume and 2 percent in value over 1931.

Chesapeake Bay States.—In the calendar year 1932 the commercial fisheries of Maryland and Virginia employed 21,084 fishermen. Their catch amounted to 359,007,000 pounds, valued at $5,905,000—an increase of 26 percent in volume, but a decrease of 18 percent in value as compared with the previous year. In addition there was a production of 1,475,000 bushels of seed oysters, valued at $159,000. The shad and alewife fisheries of the Potomac River were prosecuted by 703 fishermen who caught 2,264,000 pounds of shad, valued at $173,000 and 6,845,000 pounds of alewives, valued at $24,000, representing an increase of 10 percent in the catch of shad, but a decrease of 7 percent in the catch of alewives.

South Atlantic and Gulf States.—During the calendar year 1932 the commercial fisheries of North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Texas employed 21,560 fishermen. Their catch amounted to 299,917,000 pounds, valued at $6,428,000—an increase of 4 percent in volume, but a decrease of 20 percent in value as compared with the previous year. In addition, there was a production of 40,000 bushels of seed oysters valued at $8,000.

Pacific Coast States.—The commercial fisheries of Washington, Oregon, and California in the calendar year 1932 employed 17,900 fishermen. Their catch amounted to 560,828,000 pounds, valued at $9,484,000—a decrease of 6 percent in quantity and 30 percent in value as compared with 1931. The total catch of halibut by the United States and Canadian vessels amounted to 43,458,000 pounds, valued at $1,740,000—an increase of 1 percent in quantity, but a decrease of 39 percent in value as compared with the preceding year.

Lake States.—During the calendar year 1932 the Lake fisheries (Lakes Ontario, Erie, Huron, Michigan, and Superior, and Namakan and Rainy Lakes, and Lake of the Woods of the United States and Canada) produced 110,675,000 pounds of fishery products. Of the total, the United States accounted for 83,744,000 pounds, valued at $4,332,000—a decrease of 9 percent in quantity and 28 percent in value as compared with the United States catch in the previous year. The Lake fisheries in the United States gave employment to 6,900 fishermen in 1932.

Mississippi River and tributaries.—No survey was made of the fisheries of the Mississippi River and tributaries for the year 1932. In 1931 these fisheries gave employment to 15,900 fishermen, and their catch amounted to 82,382,000 pounds, valued at $2,897,000.

MANUFACTURED PRODUCTS IN THE UNITED STATES AND ALASKA, 1932

Fresh and frozen packaged fish.—The production of fresh and frozen packaged fish in the calendar year 1932 amounted to 51,976,000 pounds, valued at $5,741,000. The most important species packaged was haddock, which alone amounted to 33,401,000 pounds, valued at $3,357,000. Statistics of production of fresh and frozen packaged shellfish were not obtained for 1932.

Frozen products.—The production of frozen fishery products in 1932 amounted to 92,472,000 pounds, estimated to be valued at about $7,000,000. The volume of the production was 18 percent less than in 1931. The more important products frozen with respect to volume were mackerel, ground fish, salmon, whiting, and shellfish.

Cured products.—Statistics of the production of cured fishery products were not obtained for the year 1932, but in 1931 the output amounted to 98,969,000 pounds, valued at $12,364,000.

Canned products.—Canned fishery products produced in 1932 amounted to 416,062,000 pounds, valued at $43,749,000—a decrease of 18 percent in quantity and 31 percent in value as compared with 1931. Canned salmon amounted to 283,631,000 pounds, valued at $26,460,000; other important products were tuna and tunalike fishes, sardines, shrimp, clam products, and oysters.

Byproducts.—During the calendar year 1931 the value of production of fishery byproducts amounted to $12,466,000—a decrease of 25 percent as compared with the preceding year. Important products in this group were marine animal oils and meals and aquatic shell products.

MARKETING INVESTIGATIONS

The shrimp industry.—A survey of the shrimp industry of the South Atlantic and Gulf States, which in 1932 produced 96,000,000 pounds, valued at $2,700,000 to the fishermen, points out the advisability of study of conservation measures, technological development, and improved business methods, and includes much data on the economic aspects of this industry.

Standardization or grading fish and fishery products.—At the request of various States, members of the industry, and others interested in the fisheries, the Bureau has continued its study of the possibilities for establishing and applying voluntary marketing grades or standards for fishery products.

TECHNOLOGICAL INVESTIGATIONS

Technological investigations include studies of methods of manufacture, preservation, storage, and marketing of both the primary products of the fisheries for food and the byproducts for animal nutrition; biochemical tests to determine the food value of these products; the development of fishing gear; and experiments in preparing chemical treatments to fishing nets to lengthen their usefulness. These investigations have involved the application of the sciences of chemistry, engineering, bacteriology, and general technology to the solution of the problems arising. The accomplishments of the Bureau's technological staff, during recent years, have resulted in notable contributions of outstanding value to both American fisheries and American agriculture. Among these achievements is the discovery of ample domestic sources of vitamin-bearing fish oils for both human and animal nutrition. These fish oils, rich in vitamins, such as halibut liver, cod liver, swordfish liver, sardine, salmon, and many others, are absolutely essential to the maintenance of a high standard of nutrition among our people and are of economic necessity to the American farmer in raising further food for our national dietary. Other accomplishments during the past year by the technological staff of direct economic value to the fishery industries are the development of chemical preservatives for lengthening the useful life of fishing nets and gear, the discovery of important facts concerning the peculiarly valuable food properties of fishery products as one of our great basic food industries, the development of better methods for manufacturing fish meal for use by the agricultural industry, and the discovery of better methods for the preservation and handling of various products of the fisheries.

Preservation of fishery products for food.—These studies have consisted of the development of improved methods for handling fresh and frozen fish, improvements in the smoking of fish, methods of canning fish in the home, and the bacteriology of fish preservation and storage. Technologists of the Bureau have developed an electrometric method for the determination of the relative freshness of fish flesh. They have found that, in order to produce smoked fish of uniformly high quality, the factors affecting the quality of smoked fish, such as temperature, humidity, volume of smoke, etc., must be controlled. Finnan haddie of uniformly high quality were produced experimentally. Methods of home canning fish are being worked out. The changes caused by the action of bacteria are closely related to the chemical changes which accompany enzyme action in the fish flesh. Attempts are being made to correlate the various stages of spoilage with the bacteria count in each of these stages. This has included studies of the bacteriology of the various experimental methods of fish preservation described above.

Preservation of fishery byproducts.—Studies on the improved manufacture of fishmeal from nonoily fish waste demonstrated that by careful control of drier operation this type of material can be converted into a very high-grade meal by a single drying operation, without experiencing appreciable difficulty from glue formation. Material so produced has a particular advantage as a feedstuff in that it possesses considerable vitamin G potency. The effect of drying time and temperature of drying on various factors influencing the nutritive value of fishmeal was determined and additional information was obtained on the relative importance of such factors.

Data obtained from the examination of a large number of haddock-liver oil samples indicated that oil prepared from livers taken from fish caught during the summer months, especially on Georges Bank, will occasionally have an iodine number which will exceed the maximum upper limit prescribed for cod-liver oil in the United States Pharmacopoeia.

At the present time, large quantities of salmon waste are not being utilized. This material is capable of yielding an oil comparable to cod-liver oil in vitamins A and D, and a fishmeal of high feeding value. In order to assist in increasing the utilization of salmon waste and to improve the product now manufactured, technologists were assigned to the Pacific coast to conduct research on this problem. The results to date, while only of a preliminary nature, indicate the possibility of considerable improvement in the waste-utilization problem of the salmon fishery.

Studies on the oil extractable from the livers of swordfish taken off the New England coast show that this oil is an even richer source of vitamins A and D than halibut-liver oil. This is an extremely important discovery.

One method of increasing the usefulness of fish oils is to increase their keeping qualities. Studies are being carried on with the use of antioxidants or inhibitors for the purpose of preventing excessive oxidation and rancidity.

Nutritive value of fishery products.—It has been found that a diet of oysters and milk not only permits normal blood formation but also good growth, reproduction, and lactation in laboratory animals. Experiments in which white rats have received diets for a period of 12 months which are many times richer in copper than any oysters found on the market reveal that when the element is fed in conjunction with oysters a smaller quantity of the metal is stored in the liver than when fed with the stock diet alone. The toxicity of the copper contained in market oysters should, therefore, give very little concern.

Other nutrition studies have revealed the relatively high vitamin content of various fish oils, such as swordfish-liver oil, oils from salmon cannery trimmings, salmon eggs, salmon livers, and other miscellaneous fish oils.

Development and improvements of fishing gear.—The mesh size of nets determines the kinds and numbers of undersized and immature fish which will be permitted to escape from the commercial fishermen in the interests of conservation. Technologists of this Bureau and of the Bureau of Standards have made a study of devices to enable the conservation authorities of the States to establish and apply uniform enforcement of regulations pertaining to the mesh sizes of nets.

For many years methods have been studied for chemically treating nets in order to prolong their useful life. In addition to recommendations for treating these nets with toxic dyes as suggested in previous annual reports, it has been found, during the past year, that chrome tanning of the cotton netting gives excellent results and that, where bacterial action on nets is not serious, an improved method of cutching twine produces good service. In all cases, better results are obtained by covering the treated nets, in addition to one of the above treatments, with a good grade of tar, properly applied. Mercury compounds are valuable in checking weed and other marine growths on nets exposed in waters for varying lengths of time.

BIOLOGICAL FISHERY INVESTIGATIONS

Reduced appropriations made it necessary to curtail drastically scientific investigations on the main problems of the national fisheries. In spite of a smaller staff, diminished laboratory facilities, and lowered operating funds, a reorganization made it possible to carry on the most essential lines of research. Funds furnished by the Public Works Administration enabled the undertaking of important lines of investigation which had previously received little attention.

Investigations of the commercial fisheries are concerned with the changes in abundance of the food fishes of the North and Middle Atlantic areas and with the correction of abuses in the commercial fisheries of the Great Lakes. The shrimp fishery of the South Atlantic and Gulf has also been studied with the aim of discovering and preventing depletion of the supply; and the salmon and herring fisheries of Alaska are undergoing scientific analysis as a basis for their regulation. Aquicultural investigations include studies on the improvement of hatchery technique for both cold- and warm-water fishes and the planning of rational stocking policies in interior waters. Shellfishery investigations have been directed toward improving the quality of the oysters in the North and Middle Atlantic section and toward increasing the production by cultural methods in the South and on the Pacific coast.

With funds received from the Public Works and Civil Works Administrations studies were made on fresh- and salt-water pollution; the formation of a rational stocking policy for our national parks and forests was undertaken, as well as studies of fish protective devices to be used in connection with certain physical developments along the important fishing rivers.

FISHERY INVESTIGATIONS OF THE ATLANTIC AND GULF STATES

The haddock catch, which has been declining steadily since the peak year of 1929, showed signs of recovery in 1933 when the total landings at major fishing ports reached 138,000,000 pounds. This was about equal to the catch in 1932 but far short of the 243,000,000 pounds landed in 1929. The termination of the downward trend came largely as the result of the improved fishery on the banks off the Nova Scotian coast, which approximately counterbalanced a moderate decline on Georges Bank and South Channel. On the latter banks, which normally supply the major part of our haddock catch, the abundance of marketable haddock during the spring and summer of 1933 was considerably less than during the corresponding part of the previous year, but in the fall and winter was raised by the influx into the commercial catch of fish of the 1931 class which then were reaching marketable size. However, the average level for the entire year was considerably less than in 1932 and was primarily responsible for the decline in the catch from this area. On the banks off the Nova Scotian coast haddock of the relatively numerous 1929-year class reached marketable size in the summer and fall of 1933 and caused a great increase in the catch. This was the same year group which caused the improved catch on Georges Bank in 1932, but due to the difference in growth rate the haddock of this class did not reach commercial size on the Nova Scotian banks until more than a year later.

The prospects are good for a somewhat improved yield in 1934. The average abundance on Georges Bank should be about the same or possibly somewhat less than in 1933, depending on the 1931 class. The extent of this class cannot be determined at present owing to the lack of facilities for work at sea which makes it impossible to obtain any good measure of the magnitude of a year class until it has been in the fishery for about a year. The yield (catch per trawler day) on the banks off the Nova Scotian coast will be much greater during the spring and summer of 1934 than during the pervious year, but should be somewhat less in the late fall and winter.

At the present time the study of the haddock fishery has revealed the major causes of the fluctuations in the abundance of haddock on the banks. In addition, the experiments with savings gear have demonstrated that the use of the correct mesh in the otter trawls will reduce the present destruction of millions of undersized haddock to about one-fifth the present amount, a saving that will contribute directly to the success of the commercial catch in later years. However, the major objectives still lie ahead; the accurate evaluation of the factors causing good or poor fishing seasons which will enable us to forecast any important increases or decreases in the haddock catch; and the accurate determination of growth rates, mortality rates, and migration, which will enable us to determine the minimum size below which it is economically wasteful to capture haddock. This information is vital for the intelligent exploitation of this resource. Its attainment depends on the availability of facilities for work at sea involving the study of abundance and mortality of haddock below commercial size and the study of migrations.

The regular spring prediction of abundance of mackerel for the 1934 season was issued by the Bureau near the beginning of the season. At that time it appeared that the abundance would be nearly the same as in the previous season and would have provided a catch approximating 54,000,000 pounds if exploitation had been normal. This amount being in excess of the probable market demand, the industry, under authority provided by its Code of Fair Competition, curtailed its mackerel seining activities. In this manner the results of scientific research have been useful to the industry. The trend toward planned exploitation renders more urgent the need for advances in scientific knowledge of this fishery. Badly needed investigations of the reasons for variations in the rate of annual decline of the several year classes and variations in their seasonal appearance in different areas have had to be deferred because of the lack of means for their pursuit.

Investigations of the shore fisheries of the Middle Atlantic States were continued on a greatly reduced scale. It was necessary to abandon several series of field observations before conclusive results were secured, thereby diminishing the value of the results obtained through funds expended on these observations in previous years.

Results of tagging experiments have demonstrated that certain of the more important species migrate extensively over the entire continental shelf between Massachusetts and North Carolina, hence cannot be protected effectively by uncoordinated regulations of individual States. Since the winter trawl fishery is conducted outside the jurisdiction of the States, the continued growth of this fishery adds greatly to the difficulties of protection under the present system of independent legislation by the several States.

Because of the interstate and extraterritorial nature of the fishery, the responsibility for securing knowledge essential for the conservation of this important natural resource is clearly Federal. There is a widespread demand on the part of commercial fishermen and anglers in the Middle Atlantic States for resumption and extension of the scientific studies necessary to provide a sound basis for formulation of a wise conservation policy.

The shrimp investigations conducted by the Bureau in cooperation with the States of Louisiana, Texas, and Georgia have continued the field work throughout the entire range of the commercial shrimp fishery with various modifications to meet the special needs of the problem. Definite evidences have been gathered which show that the shrimp migrate. The nature and extent of their migrations are now being studied by means of population and racial analyses, and preliminary marking experiments are under way.

Ichthyological studies of the South Atlantic and Gulf coasts have included a continuation of taxonomical examinations and revisions of the flounders, gobies, cyprinodonts, and other species. The fresh-water fishes of the State of Mississippi also were studied and a report was submitted to the recently established State game and fish commission as an aid in formulating more effective laws of conservation. The ichthyological studies included, also, a survey of the fresh-water streams and lakes of Puerto Rico, carried on in cooperation with the Insular Department of Agriculture and Commerce, the object of the investigation being the determination of the present status of the fisheries and the possibilities of future cultural operations either of indigenous or introduced species.

FISHERY INVESTIGATIONS IN INTERIOR WATERS

Owing to the severe curtailment of funds all field work has been discontinued on the Great Lakes, and the staff has devoted its full time to the analysis of the many fisheries data that have been collected during the past years but which have not yet been compiled in final form for publication. One important phase of the work that is showing promising results is the detailed study of the statistics of the commercial fisheries of Lake Huron for the 5-year period 1929–33. This study has made available not only complete data on fluctuations in the total fishing intensity and in the yield of each commercial species for each of the 6 statistical districts into which Lake Huron has been divided but includes also a precise tabulation of the fishing effort actually exerted for the capture of each of the 8 most important species of the commercial catch. This tabulation of fishing effort for each individual species (necessary since identical types of gear are employed in completely distinct fisheries), together with the elimination of the effect of the different fishing times (nights out) of the same types of gear in different geographical regions, has made possible an accurate determination of fluctuations in abundance, as measured in terms of yield per unit effort, not attainable through less refined methods of procedure. The practical value of the methods employed has been demonstrated clearly in the study of the rapid depletion of the stock that has resulted from the use of the deep trap net for the capture of whitefish.

Another important phase of the Great Lakes work involves the study of the life histories of the more important species of commercial fishes. These studies on the three species of pike perches (sauger, and yellow and blue pike perch) and the yellow perch are rapidly nearing completion and preliminary reports have already been published. On the basis of this work, recommendations are made to the various State conservation departments on proper size limits, closed season, size of mesh in nets, and other regulatory measures. As a result of these studies it was also possible to submit to the National Recovery Administration many basic data to show the need of the inclusion of certain uniform conservation measures in the Great Lakes Fisheries Code.

A manuscript was recently completed for publication on the age and growth of the cisco of certain inland lakes of northeastern Wisconsin, a study made possible by the cooperation of the Wisconsin Geological and Natural History Survey.

FISHERY INVESTIGATION OF THE PACIFIC COAST AND ALASKA

The staff of the Bureau's Seattle (Wash.) laboratory has continued its investigations of the salmon and herring populations of Alaska and the Pacific coast. These investigations, although confined to definite localities, have as their goal the determination of the causes responsible for the fluctuations in the abundance of the salmon and herring so that provisions may be made for permanent and productive fisheries throughout the entire region.

The red-salmon runs in Bristol Bay and the Karluk, Chignik, and Copper Rivers were observed and information concerning them collected. The results from the studies of the red-salmon runs in the past indicate that the mortality of the young in the streams and lakes is to a great extent responsible for the wide fluctuations in the abundance of these salmon. In view of these findings an attempt is being made to determine some of the causes responsible for this mortality in the Karluk River system.

The studies dealing with the homing instinct and age at maturity of the pink salmon have been submitted in a report which is being published by the Bureau. Observations of the pink-salmon runs in southeastern Alaska were continued for the purpose of determining the causal factors responsible for the fluctuations in the time of appearance and abundance of these runs.

A report has been submitted showing areas inhabited by each of the principal herring races in southeastern Alaska. This information will be of great value in segregating the catch statistics so that the abundance of each race may be determined separately and the intensity of the fishing regulated accordingly.

The statistical study of the sockeye-salmon fishery in Puget Sound has been continued and is demonstrating that severe overfishing eventually will destroy the sockeye-salmon runs in the Fraser River which virtually support this fishery. An attempt is being made to compile a formal report of this study within the next year so as to provide a basis for the regulation of this fishery in order to restore it to its former abundance.

The coho salmon that frequent the waters of the Pacific Coast States and Puget Sound provide the basis for a large sport fishery as well as the commercial fishery in this region. During the past year the Bureau has undertaken a study of the fluctuations in the abundance of these fish for the purpose of recommending measures that will provide for a permanent supply of the coho salmon, both for commercial and recreational purposes.

AQUICULTURAL INVESTIGATIONS

The investigations in the interest of improved fish-cultural practices have recently been expanded to include field studies dealing with problems which are of vital concern to any program of fisheries management. Under an allotment from the Public Works Administration, stream survey and improvement work has been carried on in the national forests and parks in 15 States. The purpose of the survey is to supply information on the streams and lakes of the public domain for the development of a scientific stocking program.

Under such a program fish will be planted where they will do the most good and the mistakes inherent in the old haphazard system of planting avoided.

The stream-improvement work has been undertaken in cooperation with the Forest Service. Under this arrangement the Bureau has planned and supervised the work which has been done with labor furnished by the Civilian Conservation Corps.

Investigations of means of improving hatchery practices and providing better control of fish diseases have been continued. Breeding experiments with brook trout have been so successful in developing superior strains of fish that the work has been extended to include rainbow and brown trout.

SHELLFISHERIES INVESTIGATION

The various problems of the oyster industry were studied in Massachusetts, Connecticut, North Carolina, Florida, Louisiana, and Washington. In cooperation with the Connecticut Shellfisheries Commission, the Bureau continued observations on the growth, fattening, and seasonal changes in the nutritive value of oysters from the experimental farm near Milford, Conn. In New Haven Harbor, where dredging operations in the channel threatened the oyster bottoms, a series of analyses of the water was made for the State authorities and the amount of silt in the water and its rate of settling were determined.

In North Carolina the Bureau's experts worked out the plans of restocking the depleted oyster bottoms and supervised planting operations carried out by the State.

The development of new oil fields in the inshore waters of the Gulf of Mexico creates a new difficulty to the oyster industry. A question has arisen as to what extent the oil in the sea water may affect the oyster bottoms in the vicinity of the oil wells. This difficult problem has been studied in the field and experimentally under controlled laboratory conditions at Beaufort, N. C., Woods Hole, Mass., and Washington, D. C. It has been found that the presence of crude oil in the water decreases the rate of feeding of the oyster and adversely affects the propagation of diatoms which are used by the oyster as food.

A disease of oysters caused by a protozoan parasite, which may have been responsible for the mortality of oysters observed in previous years in certain sections of the coast, was studied at Beaufort. The investigation has not been completed, but several phases of the life history of the microorganism have been revealed.

On the Pacific coast studies of the cycles of setting of the oyster larvae proved of great value to the oystermen who arranged their planting operations in accordance with the information and advice supplied by the Bureau's laboratory at Olympia, Wash.

POLLUTION STUDIES

New methods for the biological assay of polluted waters have been developed and put into practical operation at the field stations at Columbia, Mo., Fort Worth, Tex., and aboard the floating laboratory, quarterboat *348*. These methods permit more detailed and more rapid determinations of the effects of the various stream pollutants not only on fish but on the basic fish-food organisms as well under conditions existing in the polluted waters. A systematic study of the effects of effluents of various industrial operations and of municipal sewage is being made with a view to supplying standardized data concerning both the actual and relative toxicity of these effluents to fish and fish food. As a part of this work, a comprehensive study of the toxicity of ammonia, which is one of the chief break-down products of municipal sewage and one of the principal effluents from gas factories, to fish and fish-food organisms under stream conditions, has been completed.

It has been shown by some of the work now completed that certain types of industrial and municipal wastes can be utilized to increase the plankton content of natural waters when these wastes are properly diluted and separated from noxious and toxic wastes. As a basis for plans to conserve these substances, which can be utilized in the production of fish food in inland waters, biological assays of the fish-food values of various wastes are in progress.

Long-time experiments dealing with the effects of erosion silt on fresh-water mussels have been completed at the Fort Worth substation. These experiments have definitely established the fact that even very small quantities of erosion silt are highly detrimental or fatal to the principal commercial species of fresh-water mussels. Other long-time experiments on the survival and growth of fresh-water mussels under conditions of stream pollution are in progress at Fort Worth.

ALASKA FISHERIES SERVICE

ADMINISTRATION OF FISHERY LAWS AND REGULATIONS

In general, the Bureau continued the program followed in previous years for the conservation of the fisheries of Alaska, although reduced funds made it necessary to curtail some phases of the work. The Commissioner of Fisheries visited all important fishing districts in the summer and held hearings at about 20 places, giving all interested persons full opportunity to express their views.

Restrictions on commercial fishing were modified during the season as changing conditions warranted, and revised regulations were issued on December 21, 1933, to be effective in 1934. Except for the closure of additional trap sites, most of the changes relaxed existing prohibitions, the purpose being to spread employment wherever possible without impairing the future supply of fish.

A patrol of the fishing grounds was maintained to assure enforcement of the laws and regulations. One hundred and thirty-one stream guards and special employees were engaged for varying periods in this protective work, under the direction of 12 regular employees of the Bureau. Many of these guards furnished their own launches and were stationed at the mouths of salmon streams to prevent poaching in closed areas. Fourteen Bureau vessels, manned by 53 persons, and 2 chartered vessels with 2 men patrolled the larger bodies of water.

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Five weirs for counting the escapement of spawning salmon were operated in 1933, chiefly in localities where important biological studies of the salmon have been in progress for several years. Through an allotment of $6,000 by the Public Works Administration for the purpose, arrangements were made for the operation of 11 salmon-counting weirs in Alaska in 1934. An allotment of $20,000 of Public Works Administration funds was used in reconditioning and repairing the Bureau's Alaska vessels.

Considerable work was accomplished in the Civil Works Administration project of improving natural propagation conditions in southeast Alaska by the removal of log jams and other obstructions that blocked the passage of salmon to the spawning beds. Three regular employees of the Bureau supervised the work, which gave employment to approximately 200 persons for varying periods. Notwithstanding severe weather during part of the winter, the work was carried forward throughout the first 4 months of 1934. In that time 468 salmon streams were cleared for a distance of 621 miles, and more than 100 miles of trail were cut to assist stream guards in making surveys of the spawning beds.

The destruction of predatory trout in important red-salmon rivers tributary to Bristol Bay was carried on under an appropriation of $15,000 by the Territorial legislature in 1933, to be expended the next biennium for bounty on these enemies of salmon.

ALASKA SALMON HATCHERIES

After the liberation of salmon fry and fingerlings that were reared at McDonald Lake and Afognak from eggs collected in 1932, the operation of the Government's hatcheries at those places was discontinued. One privately owned hatchery, operated under the provisions of the Alaska fisheries act of June 26, 1906, collected 20,650,000 red-salmon eggs in 1933, from which 20,030,000 fry were produced and liberated in Alaska waters.

PRODUCTS OF THE FISHERIES

Although the quantity of fishery products in Alaska in 1933 was slightly less than in the preceding year, there was a marked improvement in value, which was of material benefit to the fishermen. Several plants were reopened and employment was given to a larger number of people than in 1932.

Salmon products comprised about 76 percent in quantity and 92 percent in value of the total output of the Alaska fisheries in 1933. Ninety-five percent of the salmon production consisted of canned salmon, the pack amounting to 5,226,000 cases, or 250,829,000 pounds, valued at $28,376,000. As compared with the pack for 1932, the output of canned salmon showed a decrease of one-half of 1 percent in quantity but an increase of nearly 31 percent in value. The number of canneries operated increased from 87 in 1932 to 91 in 1933.

The total output of Alaska fishery products in 1933 was 346,480,000 pounds, valued at $32,127,000, as compared with an average of 373,624,000 pounds, valued at $40,329,000, for the 5-year period from 1928 to 1932, inclusive. The value of the 1933 catch to the fishermen was approximately $9,089,000, or about $2,118,000 more than in the preceding year. There were 21,695 persons employed in the various branches of the industry, as against 20,122 in 1932.

ALASKA FUR-SEAL SERVICE

GENERAL ACTIVITIES

The Pribilof Islands fur-seal herd has increased steadily under Government management, and in 1933 the killing of surplus males was the largest for any year since 1889. About 80 percent of the skins obtained on St. Paul Island were taken by the stripping process, which necessitates removal of the blubber before curing.

Sealing operations were under the direction of a staff of regular employees and were performed by Pribilof Islands natives and by approximately 60 natives brought from the Aleutian Islands for the active sealing season. The work of blubbering the sealskins was done by employees of the Fouke Fur Co., in accordance with the provisions of the fur-seal contract.

In addition to the general repairs and upkeep of buildings and equipment, three new houses for natives were erected on St. Paul Island, and the boat ways at East Landing were completed. There was also some extension of improved roads to facilitate the hauling of sealskins from the killing grounds to the curing plant.

Cooperative assistance was rendered by the Navy Department in detailing the U. S. S. *Vega* to transport the annual supplies to the Pribilof Islands and to bring out the season's take of sealskins, and by the United States Coast Guard in maintaining a patrol for the protection of the fur seals.

For the first time since the fur-seal treaty of 1911 became effective, the Government of the Dominion of Canada in 1933 elected to take delivery of its share of the sealskins taken at the Pribilof Islands, instead of 15 percent of the net proceeds of sale. The skins accordingly were delivered to a representative of that Government at Seattle in August 1933.

SEAL HERD

The computed number of animals in the Pribilof Islands fur-seal herd on August 10, 1933, was 1,313,568, an increase of 98,607, or 8.08 percent over the corresponding figure for the previous year.

TAKE OF SEALSKINS

In the calendar year 1933 there were taken on the Pribilof Islands 54,550 fur-seal skins, of which 44,448 were from St. Paul Island and 10,102 from St. George Island. This was an increase of 5,214 over the total take in 1932.

SALE OF SEALSKINS

Two public auction sales of fur-seal skins taken on the Pribilof Islands were held at St. Louis, Mo., in the fiscal year 1934. On August 28, 1933, there were sold 18,047 black dyed, 6,192 logwood-brown dyed, and 237 miscellaneous skins for a gross sum of $469,761.50.

At the second sale, held on April 30, 1934, 17,617 black dyed, 10,039 logwood-brown dyed, and 445 miscellaneous skins were sold for $575,041.25. At the same time 170 raw-salted Japanese fur-seal skins that had been allotted to the United States as its share of skins taken on Robben Island in 1933 were sold for $467.50.

Special sales of Pribilof Islands sealskins authorized by the Secretary of Commerce in the fiscal year 1934 consisted of 432 black dyed, 25 logwood-brown dyed, 120 safari-brown dyed, and 13 exhibition skins, at a total of $13,590.44.

FOXES

Blue-fox herds are maintained on St. Paul and St. George Islands, where they roam at large and ordinarily find an abundance of natural food. Prepared rations are fed them during the winter, at which time the animals are trapped for their pelts and for marking and releasing for breeding stock.

The 1933–34 season's take of fox skins consisted of 214 blue and 23 white skins from St. Paul Island and 700 blue and 2 white skins from St. George Island, a total of 939. Thirty-five foxes on St. Paul Island and 192 on St. George Island were marked and released for breeding.

In the fiscal year 1934 there were sold at public auction 1,119 blue and 22 white fox skins that had been taken on the Pribilof Islands in the 1932–33 season. The blue pelts brought $36,297, and the white pelts $496, a total of $36,793.

FUR-SEAL SKINS TAKEN BY NATIVES

Under the provisions of the North Pacific Sealing Convention of 1911, Indians of the United States and Canada in 1933 took 2,076 fur-seal skins, which were duly authenticated by officials of the respective Governments. Of these skins, 63 were taken by Indians of southeast Alaska, 29 by Indians of Washington, and 1,984 by Indians of British Columbia.

FUR-SEAL PATROL

A patrol for the protection of the fur seals during their northward migration and while at the Pribilof Islands was maintained by the United States Coast Guard, which detailed six vessels to this work. Two vessels of the Bureau also participated in the patrol—one at Neah Bay, Wash., and one in southeast Alaska.

PROPAGATION AND DISTRIBUTION OF FOOD AND GAME FISHES

The requirements for economy were met by the complete closure of nine fish-cultural stations, and by operating practically all the remaining establishments on a sharply restricted basis. As a consequence, the output of fish and eggs decreased almost 4,000,000.000 in comparison with the production of the previous year. The 1934 output comprised 3,258,131,200, in comparison with the 7,202,155,000 of the previous year, or a reduction of more than one-half. The commercial fisheries are to a large extent supported by natural reproduction, hence emphasis was placed upon the propagation and distribution of those forms which are required to maintain good fishing in the public domain, and in all public waters of the interior sections. Consequently, there was an actual increase in the production of 10 varieties of game fish, which included all the game trout and the largemouth and smallmouth bass, as well as grayling. The increases ranged from less than 25 to over 70 percent.

A further modification required by curtailment of appropriations involved a change in the system of distribution. The delivery of fish gratis to applicants was strictly limited, and the bulk of the output destined for interior waters was received directly by the applicants at the hatcheries at no expense to the Government. It is gratifying to report that there was in general a favorable response to this change, and the whole-hearted cooperation of sportsmen's clubs and individuals was very evident.

The yield of fingerlings, consisting of fish several inches in length up to adult size, was considerably reduced, dropping to 126,368,200, a reduction of over 50,000,000 under the 1933 figures. This was largely owing to the fact that the salvage operations on the upper Mississippi River, from which a large number of fingerling fish are secured, were greatly restricted. It may be further pointed out that while there was of necessity a tremendous drop in the production of the Federal hatcheries, there was no indication of a slackening in the demand for fish, particularly for game varieties. Several forms such as the cisco and pollock, which have been handled in previous years, were not propagated in 1934.

PROPAGATION OF COMMERCIAL SPECIES

Marine species, Atlantic coast.—Only two hatcheries propagated these forms during the year, the establishment at Gloucester being one of those which was closed on account of the shortage of funds. As a consequence the production of these varieties was considerably reduced. The percentage of marine commercial forms in the total output was 66.5 percent as compared with the normal proportion of approximately 85 percent. The activities of the stations at Woods Hole, Mass., and Boothbay Harbor, Maine, were greatly circumscribed, the former being responsible for the greater share of the output of cod, haddock, and flounder.

Pacific salmon.—Both salmon hatcheries in Alaska were on an inactive basis; consequently, there was a reduction in all species of Pacific salmon except the steelhead variety. The number of sockeye salmon produced was less than 50 percent of that in previous years. Approximately normal conditions prevailed at the other Pacific coast hatcheries at which these forms are propagated.

Anadromous species, Atlantic coast.—Here, too, there was a noticeable reduction in the output of shad, Atlantic salmon, and yellow perch. It was impossible to obtain any Atlantic salmon eggs whatever in exchange with the Canadian Government, and the limited distribution of this species consisted of fingerlings held over from the previous year.

The Edenton (N. C.) station was successful in securing an increased number of shad, but this gain was offset by a sharp reduction of operations on the Potomac River. The run of shad was greatly reduced for reasons which have not been fully determined, but are ascribed to the severe winter. No effort was made to propagate yellow perch on the Potomac River, but scattered production was obtained from other hatcheries. No glut herring were handled at all.

Commercial species, interior waters.—The closure of all the commercial hatcheries on Lake Michigan was responsible for a negligible production of whitefish and lake trout. No attempt was made to secure eggs of the cisco or lake herring. While the Duluth (Minn.) station was in operation it was possible to secure only a limited number of eggs. The Cape Vincent (N. Y.) station, as has been the case for the last several years, was unable to secure any worthwhile number of eggs of the commercial species, and therefore concentrated its activities on game forms. With the pike perch, however, cooperative activities with the State of Ohio at Put in Bay yielded a record collection of eggs, yielding an output of 836,000,000 fry. The eggs were incubated at both the State and Bureau's hatcheries.

RESCUE OPERATIONS

Reduction of the appropriation for fisheries work in the Upper Mississippi Wild Life Refuge to negligible proportions made it impossible to carry on the rescue or salvage of fish to the extent followed under normal conditions. Fish become trapped in landlocked sloughs upon recession of the water throughout a large part of this refuge. Seining crews are sent out to salvage them and return them to open waters. Lack of financial resources for the support of a normal number of crews reduced the number of rescued fish in 1934 to 22,643,000, in comparison with a normal collection of over 50,000,000. Controlled semiartificial ponds within the refuge were operated, however, to produce a satisfactory yield of bass. Some rescue work was carried on in the vicinity of the Fairport (Iowa) station.

AQUARIUM

The aquarium located under the main lobby in the Department of Commerce Building is becoming increasingly popular. It has been visited by many organizations such as Boy Scout troops and biology classes, as well as miscellaneous students and the general public.

At the close of the year there were on display 1,533 fish, comprising 62 varieties, and 107 aquatic animals of 6 varieties. During the year a stock of chinook salmon, hatched in the aquarium, has been reared; and there is now on hand a very creditable display of this species, comparatively little known in the East. Over one-half million trout, salmon, whitefish, perch, and shad eggs were displayed and hatched in the model hatching apparatus maintained for demonstration purposes. This activity, together with a model fishway, has been a source of great interest.

The staff of the aquarium has been called on frequently for expert advice in problems relating to the maintenance of home aquaria, ornamental fish pools, etc. The reserve tanks in the aquarium have been utilized for the temporary holding of game fish destined for distribution and planting in nearby waters.

BLACK BASS AND ANGLERS DIVISION

In cooperation with State fish and game authorities the black-bass law has been reasonably well enforced in most of the States where black bass are found in numbers. Through the united efforts of all interested, including the anglers, commercial fishermen, shippers and conservation organizations, a great deal has been accomplished. The work of the Division has been materially enlarged to include a service for the angler in connection with matters pertaining to fish and fishing, such as information in regard to laws, kinds of tackle and baits to use, where certain species are to be found, etc.

There are 3 persons regularly employed in the Division, assisted by from 90 to 103 deputy black-bass law inspectors, who are State officials receiving no salary from the Federal Government but who function under the supervision and direction of the Chief of the Division.

But 5 State legislatures met in regular session in 1934, in which needed black-bass legislation could be obtained, and progress was made in 3 of these. A large amount of educational work was done in the States where further legal protection is needed and where legislatures will be in session in 1935.

There have been illegal shipments of black bass made in various sections of the country. A number of seizures of bass have been made and turned over to charitable institutions. Illegal shipments between Mississippi and Arkansas, Illinois and Missouri, and Maryland and Pennsylvania were formerly of frequent occurrence but have been reduced to a minimum by the activities of the State officials in cooperation with the field officers of the Division, principally through warnings and a large number of seizures under State laws. Considerable difficulty has been had in reference to shipments from Tennessee to Mississippi and Missouri, which have not yet been entirely controlled. Shipments from Florida, and shipments into Indiana, have caused some trouble but have been taken care of, but amendments to the laws of these two States must be made before this situation can be considered satisfactory.

The educational part of the work, impressing upon those interested, the provisions of the Federal law and the necessity of further protecting our valuable black bass, has been successfully continued through publication in the daily press, sporting magazines, and by radio talks.

Fishery Circular No. 9, containing the game-fish laws, the black-bass law in full, the progress in black-bass legislation, and the aims and recommendations of the Bureau in connection with the administration of the law, was revised and republished as Fishery Circular No. 16. (Copies of this circular may be procured from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 5 cents each.) A tabulation of the fishing licenses issued by the States and the revenue therefrom was assembled and published for the first time. Various other leaflets were prepared and released, covering such subjects as part-time licenses, sales of black bass, list of books on angling, necessity of returning small fish to water, etc., for all of which there is a constant demand.

Markets in the principal large cities in Central and Eastern States have been regularly inspected by the field officers for illegal black-bass shipments, and investigations of reports of violations have been made when required. In connection with investigations, the field officers have attended and addressed a great number of gatherings of anglers, sportsmen, conservationists, and others, on the subject of the Federal black-bass law and the necessity for giving these valuable game fish more adequate legal protection.

VESSELS

The *Albatross II* formerly used by the Bureau in its offshore fishery investigations was returned to the Navy Department during the fiscal year. This was done for two reasons: First, the vessel was very old and not well adapted for the Bureau's work and, second because of reduced funds the Bureau was unable to continue it in operation.

The steamer *Shearwater* was engaged in the usual fish-cultural work at the Put in Bay (Ohio) station during the fall and spring months.

The motor vessel *Fulmar* was turned over to the Division of Conservation of the State of Ohio for its use in fish-cultural operations under a revocable license providing for its maintenance and operation by the licensee and also providing that the licensee would furnish the Bureau with such vessel service as required in connection with its operations at the Put in Bay (Ohio) station.

The *Pelican* was used in connection with fishery investigations off the coast of Maine, and also in fish-cultural work at the Boothbay Harbor (Maine) station.

Fifteen vessels of the Alaska service cruised about 123,000 nautical miles in the fiscal year 1934, as compared with 132,700 nautical miles in the previous year. The *Penguin* covered approximately 28,000 miles, the *Crane* 15,900 miles, and the *Brant* and *Teal* each 11,400 miles.

The *Penguin* served as tender for the Pribilof Islands, with base at Unalaska. Five round trips were made to Seattle during the year to transport personnel and perishable and emergency supplies.

Of the vessels that engaged in fisheries protective work, the *Auklet*, *Murre*, *Petrol*, and *Widgeon*, were employed in southeast Alaska. The *Crane* and *Teal* were in the Alaska Peninsula region and on Cook Inlet, respectively, until about the middle of August, and later assisted with the patrol and stream inspection in southeast Alaska. The *Blue Wing* and *Red Wing* were in the Kodiak-Afognak area, the *Kittiwake* on Prince William Sound, the *Ibis* at Chignik, the *Eider* in the Alaska Peninsula district, the *Scoter* on Bristol Bay, and the *Coot* on the Yukon River.

The *Brant* was used in general supervisory work, chiefly in southeast Alaska, although one trip was made to the westward as far as Bristol Bay. It was engaged also for a short time in the fur-seal patrol off Neah Bay, Wash., relieving the *Eider* in that duty toward the end of April. The *Teal* patrolled waters in the vicinity of Sitka, Alaska, for the protection of the fur-seal herd during its northward migration. The *Auklet* and *Scoter* participated in the Civil Works Administration project of clearing salmon streams in southeast Alaska of log jams and other obstructions that blocked the passage of salmon to the spawning grounds.

Through an allotment by the Public Works Administration, the *Penguin*, *Eider*, *Crane*, *Brant*, *Murre*, *Kittiwake*, *Teal*, and *Scoter* were reconditioned at Seattle during the winter.

APPROPRIATIONS

Appropriations for the Bureau for the fiscal year aggregated $1,778,850, as follows:

Salaries	$160,400
Miscellaneous expenses:	
Administration	3,000
Propagation of food fishes	801,755
Maintenance of vessels	200,000
Inquiry respecting food fishes	173,000
Fishery industries	78,000
Protecting sponge fisheries	2,750
Protecting seal and salmon fisheries of Alaska	340,000
Upper Mississippi Wild Life and Fish Refuge	6,835
Enforcement of black-bass law	13,110
Total	1,778,850

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FISHERY INDUSTRIES OF THE UNITED STATES, 1933 [1]

By R. H. Fiedler, *Chief, Division of Fishery Industries*, John Ruel Manning, *Chief Technologist*, and F. F. Johnson, *in charge, Statistical Investigations, United States Bureau of Fisheries*

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[1] Appendix I to the Report of the U.S. Commissioner of Fisheries, 1934. Approved for publication, Mar. 19, 1934.

FOREWORD

In order to understand the great economic importance to the Nation and to the public welfare of the field of service which this Division of the Bureau's activities covers, it is necessary to bear in mind that there are only two basic food industries, namely, the products of the land and the products of the sea. Food must be obtained from either land or sea. In the broad sense, the fisherman is the farmer of the sea. As such, he is a primary producer and at the present time he is in need of the same services as are being given to the farmer of the land. This will give a general perspective of the functions which should be performed by the Division of Fishery Industries. This report only describes the functions which the Division actually performs with the personnel, funds, and facilities available. It thus can be seen quite readily that there is a wide variance between the functions which the Division could and should perform with adequate facilities and those functions which it does perform with present facilities. The chief need of the fishery industries of this country today is a more efficient and orderly system of marketing its products. These marketing reforms cannot be worked out overnight. Very little study has been made by the Federal establishment of marketing methods in the fisheries. The importance of laying the foundation, as soon as possible, for these marketing studies in the fisheries will be apparent as this report unfolds. The fisheries constitute one of our great natural resources and a most vital source of foods for the American people. All of the activities and functions of this Division are devoted to the fullest economic husbandry and utilization of the annual harvests of these resources. As this report proceeds, it will be seen that some of the Division's activities have great significance in conservation and thus are of great concern to the American people and their posterity.

This report constitutes a summary of the activities of the Division of Fishery Industries as well as an annual review of fishery statistics of the United States. As its name indicates, this Division of the Bureau is concerned with the activities and welfare of the fishery industries, including the commercial fisheries, the trade in fishery products, and the fish canning and preserving industries. Its functions include the collection and publication of fishery statistics, the conducting of market surveys, the prosecution of research designed to solve the technical problems of the industry, and the dissemination of authoritative and practical information to the fishery industries and the public. Results of technological investigations and marketing studies are published in separate documents as each project is completed. The information obtained from statistical surveys is published in part 2 of this report, which includes detailed statistical information for the year 1932 that has become available since the issuance of the previous report ("Fishery Industries of the United States, 1932," by R. H. Fiedler), together with such summarized statements and interpretations of the statistics as are deemed significant and useful. In the preparation of this report, members of the Division's staff have taken part and their assistance is appreciatively acknowledged.

COOPERATION WITH THE STATES

Because of the Division's recognition of its responsibilities for service to the industry, as indicated in the preceding paragraphs, it has made every effort to obtain the maximum of accomplishment and extend its services to the fullest extent with the relatively small appropriations and facilities available. Therefore, it has initiated, encouraged, and fostered cooperation with the States in all branches of the Division's various functions and activities. Obviously, this method has brought results with a minimum of expense to the taxpayer, commensurate with efficient performance. Cooperation with the States has been especially helpful in the scientific investigations of the Division. In the technological section, many State agencies have cooperated in extending their facilities for the prosecution of these studies. State universities, hospitals, agricultural experiment stations, and other State institutions of research have contributed of their personnel and laboratories in various projects. Especially has this been true in the nutrition studies. Among the State institutions cooperating in this work are the South Carolina Food Research Commission and State Medical College, Charleston, S.C., the Massachusetts State Agricultural College, Amherst, Mass., the Ohio State Agricultural Experiment Station, Wooster, Ohio, the New York State College of Agriculture, Cornell University, Ithaca, N.Y., Washington State College and Agricultural Experiment Station, Pullman, Wash., the University of Washington, Seattle, Wash., and the University of Maryland, College Park, Md. In addition to cooperation in nutrition investigations, the members of the staff of the Massachusetts State College, Amherst, Mass., rendered valuable aid to the technological staff of the Division's laboratory at Gloucester, Mass., in the furtherance of the various experimental projects which this laboratory is carrying out. In tests of fishing gear, with respect to measurement of mesh size of nets, cooperation has been received by our technological staff from the States bordering on the Great Lakes.

In certain marketing investigations, including the studies of the grading of fish, the States of Virginia, North Carolina, Massachusetts, Maryland, and New Jersey either cooperated actively or gave valuable aid in some form.

The Division places great dependence upon cooperative arrangements with the various States in the collection of fishery statistics. In the annual surveys of the fisheries of the Great Lakes and Pacific Coast States such exceptional cooperation has been obtained from State fishery agencies in recent years that it has been only necessary for agents of the Bureau to conduct fragmentary surveys to supplement the data available. Recently, the States of Maryland and Virginia have adopted very complete statistical programs which not only alleviate the work of our agents but also produce more accurate data.

The above States have been cited as instances of exceptional cooperation. However, nearly every State in which commercial fishing is prosecuted renders some type of cooperative service to this Bureau in connection with its statistical surveys which makes possible the surveying of much larger territories than would otherwise be possible.

In addition to the above, at the request of the Florida State Marketing Bureau and Home Extension Service of the University of Florida and the Florida State College for Women, and in cooperation with these organizations, the Division assigned a member of its technological staff to assist the State and County Home Demonstration Agents in teaching the people of that State how to preserve, cook, and otherwise prepare, and utilize to the fullest extent, the fishery products of Florida. Norman D. Jarvis, assistant technologist of this Division performed these duties. As a result of his work, Bureau of Fisheries Memorandum S-331, entitled "Method for Smoking Fish in the Southern States, with Recipes for Cooking," and Bureau of Fisheries Memorandum S-332, entitled "Method for Dry Salting Fish in the Southern States, with Recipes for Cooking," were published. In previous years, other cooperative educational work was instituted and carried out by both Mr. Manning and Mr. Jarvis of the technological staff.

COOPERATION WITH THE EMERGENCY AGENCIES OF THE FEDERAL GOVERNMENT

During 1933, various emergency agencies of the Federal Government, recently established, made considerable use of the facilities of the Division of Fishery Industries, including its technical, marketing, and statistical reports and the knowledge and experience of its personnel. Such cooperation was rendered to the National Recovery Administration, the Agricultural Adjustment Administration, the Federal Emergency Relief Administration, the Federal Surplus Relief Corporation, and others. Members of the Division's staff were detailed first to the Agricultural Adjustment Administration and later to the National Recovery Administration to supervise and assist in the formulation of fishery codes of fair competition under the National Industrial Recovery Act, and others of the staff were called at the various conferences and public hearings in connection with the development of these fishery codes. In August 1933, R. H. Fiedler, chief of the Division, was detailed first to the Agricultural Adjustment Administration and later to the National Recovery Administration to become chief of the fisheries' section in connection with these code activities. John Ruel Manning, chief technologist, and F. F. Johnson, in charge of statistical investigations, were called as Government witnesses at many of the code hearings. In addition, the Division has furnished fishery statistics to aid in the formulation of fishery codes. Technical, marketing, and statistical information and reports were also furnished to nearly all of the emergency organizations of the Federal Government established during 1933 to promote economic recovery.

Part 1. OPERATIONS OF THE DIVISION

STATISTICAL INVESTIGATIONS

The statistical investigations include the collection of primary fishery statistical data, compilation and analyses of these data, and dissemination of statistical reports. However, the funds and personnel available for this work have never been sufficient for extensive analytical work and curtailment of these items in recent years have resulted in decreased activities in connection with the collection of primary statistical data. These lessened activities are unfortunate since annual catch figures are necessary for the study of depletion of fishery resources. Furthermore, statistical analysis of economic phases of the industry are especially urgent at this time when such data are essential to administrative agencies concerned with planning and control, as well as to the industry itself.

COLLECTION OF STATISTICS

The statistical work in 1933, as in former years, included the collection and dissemination of statistics on the catch of fishery products and the operating units employed in making the catch, and, in addition, certain statistics of related fishery industries. In the former group are statistics that are intended for the use of the fishery biologist upon which to base conservation measures. They are also valuable for economic purposes. This is especially true of statistics of the landings of fish at principal fishing ports, which are published monthly. In the second group are statistics that are of use mainly for economic or trade purposes. These included statistics of canned fishery products and by-products of the United States and Alaska, cold storage holdings of fish and amounts of fish frozen, marine-animal oil production, and similar statistics.

The Division continued its plan of making annual general statistical surveys of the fisheries of the various geographical sections in 1933, and under the direction of F. F. Johnson, surveyed the commercial fisheries of our entire coastal and lake regions obtaining catch figures for 1932. Continuous annual catch figures are now available for the Great Lakes from 1913, Pacific Coast States from 1922, South Atlantic and Gulf States from 1927, New England States from 1928, and the Middle Atlantic and Chesapeake Bay States from 1929. That portion of the general statistical surveys relating to the wholesale trade, except for the production of canned, frozen, and packaged fishery products and fishery by-products which is obtained in special surveys, was omitted from the surveys made in 1933 due to curtailment in funds and personnel.

In addition to the general catch statistics, the collection and/or publication of statistics on special subjects for the year 1933, was continued during the year, as follows: The landings of fish by American fishing vessels at the ports of Boston and Gloucester, Mass., Portland, Maine, and Seattle, Wash. (published monthly); landings of halibut at North Pacific coast ports (published monthly); catch of mackerel in the North Atlantic fishery; cold-storage holdings of frozen and cured fish and amount of fish frozen, which are furnished by the Bureau of Agricultural Economics (published monthly); production, consumption, and holdings of marine-animal oils of the United States and Alaska (published quarterly by the Bureau of the Census); production of canned fishery products and by-products of the United States and Alaska; transactions on the sponge exchange at Tarpon Springs, Fla.; volume of fishery products handled at the municipal fish wharf and market, Washington, D.C.; and the volume of the United States foreign trade in fishery products, furnished by the Bureau of Foreign and Domestic Commerce.

TECHNOLOGICAL INVESTIGATIONS

Never before in the history of the fishery industry of this country has there been greater need for economy in production methods and for the fullest utilization of valuable products from the material at hand. Under present conditions of depressed business, losses or leakages in factory operation, which in more prosperous times seemed relatively unimportant, now represent very frequently the margin between profit and loss. For this reason there is greater need for the application of the best technological and engineering knowledge available to problems of manufacture, preservation, and marketing of fishery products. This is essential to make the most of the raw material available, to eliminate waste, and to bring factory operation to the highest point of efficiency. With this objective in mind, the technological research has followed the general lines of studies of methods of manufacture, preservation, storage, and marketing of both the primary products of the fisheries for food and the by-products for animal nutrition; biochemical tests to determine the food value of fishery products; the development of fishing gear; and experiments in developing chemical treatments for fishing nets to lengthen their usefulness. This has involved the application of the sciences of chemistry, engineering, bacteriology, and general technology to the solution of these problems. The discussion in the following pages is a summary of the accomplishments along these lines which have been made during the past year.

The accomplishments of the technological staff during recent years have resulted in notable contributions of outstanding value to both American fisheries and American agriculture. Among these achievements is the development by the Division's technologists of domestic fish oils of high vitamin potency, essential for use in human and animal nutrition, freeing this country from its almost complete dependence on foreign sources of fish oils of high vitamin potency.

Since, contrary to popular notion, baby chicks, rather than babies, consume most of these vitamin-bearing fish oils, this has meant a great deal to American agriculture. Information from reliable sources has indicated that, after taking into consideration all of the factors, the farmer is paying from one half to one third of the former price for these oils for animal feeding. In this connection, it should be borne in mind that fish oils are used extensively in mixed feeds as a source of the vitamin D carrier or ingredient. Recently, large pharmaceutical houses have turned to domestic sources of vitamin-bearing fish oils for human nutrition and medicinal use. This means that the entire public eventually is going to benefit from these discoveries by the technologists of this Division. Furthermore, the fisheries have benefited in that higher markets and better prices have been obtained for their products; and such inter-related or auxiliary industries, depending on these sources of raw material for their finished products, such as the pharmaceutical industry and the manufacturers of mixed feeds, also have benefited materially in that they have been made independent of foreign sources of raw material, and in that they have been able to get their raw material at more favorable prices, in many instances. In other words, all of these American industries have benefited, either directly or indirectly, from the differential in prices which is a direct result of the fish oil investigations.

Until recent years, most of the waste fish and the fish waste from the various fishery industries had not been manufactured into any products of economic value. As a result of our technological investigations, it is now possible to make fish meal of high quality for animal feeding from this waste. The fish-meal industry has now developed to a point where it makes valuable use of most of the waste or raw material available for its manufacture. There are still many places, however, where technical and economic obstacles prevent the profitable utilization of some of this waste.

Our studies of the waste from the vast filleting industry in New England have shown that a highly nutritious and palatable fish flour can be made, which is rich is calcium and phosphorus—those minerals so essential to the growth and maintenance of bones and teeth in children. Fish flour makes good soup stock and lends itself favorably to incorporation in bakery products.

Other studies which we have made of the great diversity of nutritional factors in fishery products have revealed many facts of immense value to the national dietary, such as the demonstration that oysters rank high as a source of those minerals of vital importance in the prevention and treatment of certain types of nutritional anemia.

Considerable interest has been shown in our recent published report that kelp meal is a valuable supplement to the rations of farm animals. This is particularly important since very little commercial development exists in the various seaweed industries of the United States, whereas in Japan seaweeds alone are the basis of an $8,000,000 industry.

It has been estimated that about 20 cents of every dollar that the fisherman gets for his catch is spent to replace fishing nets. This amount can now be reduced by the application to the nets of chemical preservatives which have been developed by the technological staff of this Division. A conservative estimate places the savings, which can be made annually, at approximately $2,000,000.

RESEARCH ASSOCIATE

In the above lines of technological research the Bureau has attacked those fundamental problems which promise to be of greatest value to the largest number and which are possible with the funds and personnel available for the purpose. For this reason the Division has not been able to study special problems affecting certain products, processes, or methods. In order to serve the industry in this connection, the Bureau by congressional authorization has provided research associate facilities whereby firms or groups having special technological problems to solve will furnish the investigator and pay his salary and expenses. The investigation is carried out in cooperation with the Bureau's staff in its laboratories and under its control. Thus the industry can be provided with laboratory, consultation, and library facilities which in many instances it is unable to obtain elsewhere.

LABORATORIES

During the past year, the Division carried on its technological investigations under the direction of John Ruel Manning, chief technologist, at laboratories in Washington, D.C., Gloucester, Mass., Seattle, Wash., and Charleston, S.C. All of the above are Bureau of

Fisheries laboratories with the exception of the Charleston laboratory, which is a State laboratory. In addition, certain phases of our technological investigations were conducted in other laboratories as conditions warranted. For instance, certain cooperative studies were carried out in the laboratories of the various State institutions mentioned in the preceding section of this report under "Cooperation with the States." Some of our technological studies were carried out in the laboratories of various bureaus in the Department of Agriculture, and a portion of the investigations in the preservation of fishing gear which were prosecuted in the Navy Rope Factory, Boston Navy Yard, under the control of the Bureau of Construction and Repair, Navy Department.

In Washington, D.C., the technological facilities of the Division include a nutrition laboratory, a well-equipped chemical laboratory, and a mechanical laboratory with carpenter and machine shops. Those problems which concern or affect the country as a whole are usually selected for study in the Washington laboratories. As an example, a large part of the nutrition experiments are conducted in Washington.

The Gloucester laboratory is intended primarily to serve as the headquarters for the conduct of technological investigations of the fisheries of the Atlantic coast, and is so equipped as far as possible under present conditions. The Gloucester organization includes a well equipped chemical laboratory, a bacteriological laboratory, a low temperature laboratory designed primarily for the study of fresh and frozen fish, and a small byproducts laboratory.

The Seattle organization includes a well-equipped chemical laboratory and a byproducts laboratory, with the use of some of the laboratories of the University of Washington.

The Charleston laboratory, as stated above, is a State laboratory, although the Division has personnel stationed in this laboratory and contributes to its upkeep. A financial arrangement has been worked out whereby investigations in the State laboratory can be performed at less expense to both the Federal Government and the State of South Carolina than either could conduct alone. The Charleston laboratory is equipped for both chemical and nutrition research.

PRESERVATION OF FISHERY PRODUCTS FOR FOOD

Our experimental work in fish preservation has utilized the services of chemists, engineers, and bacteriologists. Investigations in this section were carried out under the immediate direction of James M. Lemon, associate technologist, in charge of the Gloucester Technological Laboratory and by Norman D. Jarvis, assistant technologist, in the Washington Technological Laboratory.

IMPROVED METHODS FOR HANDLING FRESH AND FROZEN FISH

During the course of the investigations being conducted at the Bureau's technological laboratory at Gloucester, Mass., it became evident that it would be necessary to devise an accurate method for the determination of the relative decomposition of fish flesh. After several different methods were investigated, it was found that a combination of two of the methods gave a very satisfactory indication of both the enzyme and bacterial action in the flesh, both of which cause a breakdown in the protein composing the fish tissue. This method is based on the absorption of a standard acid solution by the protein. It was found that an accurate index of the condition of the flesh was indicated by measuring electrometrically the quantity of acid absorbed. Haddock was the species of fish upon which this test was first applied. After making tests on a series of several hundred samples, it was possible to tabulate the results in such a way that a table for general use was evolved. It was found that it would be necessary to prepare a table of this nature for each species of fish since the property for absorbing acid by the protein varies slightly in different species. At present, tables are being prepared for use with cod, pollock, and mackerel. Some tests have also been made on Pacific coast salmon.

Other problems connected with the freezing and storage of fishery products are being studied. There are a great number of variable factors and combinations which arise in the consideration of problems of this nature. Although the technologists are making an effort to solve each of these problems as they arise, the variable conditions make progress difficult and slow.

Our technologists are investigating the technique of freezing several varieties of shellfish, and the effect of storage and fluctuations of temperature in the storage room. With these studies are included such conditions as the effect of freezing and storage upon the keeping quality of the product after it has been defrosted and displayed for sale, and the rate of increase of bacteria during this same period. Oysters and shrimp are given immediate attention since these two species compose the greater portion of shellfish being marketed. The change of weight over short and long periods of time is included in the study of the effect of packing fishery products in ice for shipment. The results, which are apparent at the present time, indicate that the weight of some species of fish increases for a short period then gradually decreases until at the end of approximately 10 days a decided loss in weight is noted. It has been observed that different species of fish show different rates of decrease in weight when packed in ice for shipment.

The development of lactic acid is the cause of the well-known "rigor mortis" which occurs in the flesh of all animals immediately subsequent to death. The effect of the further development of lactic acid in fish muscle is receiving attention. Attempts are being made to correlate the presence of different quantities of this acid with the different changes which occur when fish are frozen and placed in cold storage rooms. It is believed that the presence of lactic acid in the flesh of fresh fish, which are being frozen for storage, may have a very definite effect upon the keeping quality and flavor of them when they reach the hands of the ultimate consumer. In making studies of this nature, it has been necessary for the technologists to make trips in some of the small boats and bring in live fish, keeping them alive in a tank in the laboratory until they were needed. When the necessary preparations had been made, the fish were killed and tests made immediately for lactic acid. This method permits a study of the development of lactic acid in the fish muscle at frequent intervals as it increases to a maximum, then decreases until it disappears. Samples containing a known percentage of lactic acid are frozen and the results of these various concentrations upon the keeping quality observed.

A method for packing fish and fillets in an atmosphere of carbon dioxide was developed and the effect of this procedure observed. It was found that, for long periods of shipment, the atmosphere of carbon dioxide had a decided beneficial action both on the bacterial count and on enzyme action. In the case of short periods of shipment, the carbon dioxide was not appreciably better than air. It was observed that, in order to obtain full benefit, fish should be placed in an atmosphere containing approximately 25 percent of carbon dioxide gas immediately upon being caught.

All of the present methods for the determination of water in protein compounds are tedious and require considerable time for completion and the accuracy of most of them is somewhat doubtful. In some of the studies of stored fish it has been necessary to determine the moisture content of the flesh at frequent intervals and to a greater degree of accuracy than has heretofore been possible. A method has been developed for this determination which eliminates all of the difficulties previously encountered. A period of only a few hours is required for this determination by the new method and the accuracy is far greater than any previously employed. The water combined with the protein is liberated by coagulating the protein with acetone. The water and the acetone are then evaporated leaving only the completely dried protein. It has been possible to obtain results by this method which check within one tenth of 1 percent.

The following members of the technological staff performed the above-described investigations of the chemistry of the production, handling, preservation, storage, and marketing of fresh and frozen fish: James M. Lemon, Francis P. Griffiths, Maurice E. Stansby, Louella E. Cable, Richard Locke, Francis Yetman, and Donald Bean. These scientific workers are all located in the Division's technological laboratory at Gloucester, Mass.

IMPROVEMENTS IN THE SMOKING OF FISH

For the past several years, our Gloucester laboratory has carried out experimental work in the smoking of fish. As described in previous annual reports of this Division, a small model smokehouse was constructed so as to control the various factors affecting the quality of smoked fish such as temperature, humidity, volume of smoke, etc. Finnan haddie of uniformly high quality were produced experimentally by our technologists. Reports are being prepared for publication on certain completed phases of this work.

Mackerel were found to yield a smoked product of exceptionally high quality both as to appearance and flavor. The smoke was applied at as low a temperature as possible and in an atmosphere of high moisture content. It is believed that a market for smoked mackerel could be developed which would open a considerable field for the disposal of some of the surplus mackerel at a reasonable profit to the producer.

METHODS FOR CANNING FISH IN THE HOME

Because of the great demand from home economics workers of the various counties, States, and of the Federal Government, and due to a large number of inquiries received by this Bureau for methods, safe and satisfactory to the housewife, for canning fish in the home, and because the present published literature on the subject is somewhat obsolete, we began the experimental canning of fish during the past year to obtain data for working out methods of canning fish which would be practical for the housewife with the training and equipment available to her. The following experimental packs have been made to date: Fish flakes; fish cakes; fish chowder; mullet, plain, tomato sauce, and spiced; mackerel, plain, tomato sauce, spiced, and smoked; amberfish; salmon, plain for 60 minutes, plain for 90 minutes, and spiced; grouper; squeteagues; croaker; eels; catfish; carp, plain, and spiced; lake trout; whitefish; shrimp, in number 2 cans and pints, in number ½ flat cans and 5-ounce glass jars; crab; clams, minced, whole, and chowder; and oysters. It is estimated that it will be at least another year before these results can be published by the Bureau since it will be necessary to make extensive bacteriological examinations of the experimental packs for varying periods of time after all of the experimental canning has been completed. The experimental canning in connection with this project is being carried out by Norman D. Jarvis, in our Washington laboratory and the bacteriological examinations are being conducted by Francis P. Griffiths in our Gloucester laboratory.

STUDIES IN THE BACTERIOLOGY OF FISH PRESERVATION AND SPOILAGE

The bacteriology and chemistry of fish preservation go hand in hand. Therefore, we are closely coordinating the chemical and the bacteriological phases of attack on the problems described in the preceding sections. The changes caused by the action of bacteria are closely related to the chemical changes which accompany enzyme action in the fish flesh. Attempts are being made to correlate the various stages of spoilage with the bacterial count in each of these stages. In order that a comparison might be made of the popular methods of judging the degree of spoilage with the actual bacterial count, a number of tests were conducted. Opinions as to the organoleptic tests were made and the bacterial count of the fish at each stage was taken. Charts were prepared which showed that the organoleptic test is quite indefinite and is as variable as the number of persons making the test. It would indicate, however, that the organoleptic test within a wide range correlates fairly well with the bacterial count.

In addition to the bacteriological investigations above-described, certain aspects of the bacteriology of fishery food technology were extended to the studies of the smoking of fish and of the home canning of fish. These tests have been discussed in previous sections of this report. All studies in bacteriology have been conducted in the Gloucester laboratory by Francis P. Griffiths, bacteriologist of the Division's technological staff.

PRESERVATION OF FISHERY BYPRODUCTS

During the past year research in connection with the preservation of fishery by products has been continued at the Gloucester Technological Laboratory and new work undertaken in the recently established technological laboratory located at Seattle, Wash. These studies were carried on under the direction of Roger W. Harrison with the assistance of Andrew W. Anderson and S. R. Pottinger.

IMPROVED METHODS FOR MANUFACTURING FISH MEAL FROM NONOILY FISH WASTE

The experimental work on improved methods for the manufacture of fish meal from nonoily fish waste as outlined in the 1932 report was completed during 1933. A comprehensive report of the investigation is now in the process of preparation. Data obtained during the course of the investigation indicate the following:

1. The digestibility, vitamin value and general nutritive value of the meal is affected by drying time, temperature of drying and method of applying heat, while the essential amino acid, Cystine, is affected more by temperature.
2. Of the various factors affecting the general nutritive value of fish meals which were investigated; namely, digestibility of the protein, biological value of the protein, essential amino acids and vitamin potency, vitamin G appeared to have greatest influence on the feeding results obtained with the fish meal.
3. Vitamin G is found largely in the head portion of cod and haddock fillet waste.
4. Vitamin G is found in the water soluble proteins and is therefore partially removed by wet processes for nonoily fish reduction generally used.
5. By satisfactory control of the temperature within a dryer, by regulation of steam pressure and vacuum, the glue problem encountered in the dry reduction of this type of material can be overcome.
6. Operation made possible by the conditions of (5) above, permit the preparation of a fish meal of greater general nutritive value with greater final yield of finished product.

DEVELOPMENT OF FISH FLOUR

Owing to the fact that quite satisfactory use is now being made of nonoily fish waste in the preparation of fish meal and the necessity to curtail work on account of reduced appropriations, the fish flour work was temporarily discontinued for the purpose of undertaking an investigation needing more immediate attention.

HADDOCK-LIVER OIL

The investigation concerning the physical, chemical, and biological properties of haddock-liver oil which was discussed in the 1932 report, was completed during the past year and a report of the results obtained is being prepared for publication. As stated in the last report, concern had been expressed as to the possibility of the properties of haddock-liver oil differing sufficiently from cod-liver oil to make an oil prepared largely from haddock livers incapable of meeting the existing United States Pharmacopoeia requirements for cod-liver oil, with respect to chemical and physical properties of the oil specified by the United States Pharmacopoeia.

The data obtained indicate that there is little likelihood of this occurring in the case of crude oils, but if the United States Pharmacopoeia requirements are held for winterized or cold-pressed oils, it is entirely possible that an oil of this nature will exceed the upper limit for iodine number. This is especially true in the oils from livers of haddock taken during the summer months and on Georges Bank.

By raising the upper limit for iodine number from 180 to 190, the danger of haddock-liver oil not meeting United States Pharmacopoeia requirements should be entirely eliminated.

SALMON OIL INVESTIGATION

In an effort to bring about increased utilization of fishery waste materials by conversion into useful products, the Bureau began, in 1933, an investigation concerned with the manufacture of vitamin-active oil and high quality meal from salmon waste. The possibilities for this development may be appreciated when it is considered that during 1932 the waste available from the salmon fishery was capable of yielding approximately 12,000 to 15,000 tons of meal and from 1,500,000 to 2,000,000 gallons of oil, while actual utilization resulted in the manufacture of only 2,435 tons of meal and 250,871 gallons of oil. During the season of 1933 studies were carried on in canneries located on the Columbia River and on Puget Sound. This work was largely of a preliminary nature to determine the nature and amount of oil in the different portions of the waste and the quality of the oil from the different species. Work was also begun on improved methods of oil manufacture.

The preliminary indications are that an oil can be produced commercially that will be comparable with cod-liver oil in both vitamins A and D. Also carefully prepared salmon meal should prove to be one of the best protein concentrates available for animal feeding.

The investigation is being continued and will be reported further next year.

SWORDFISH-LIVER OIL

With the discovery and successful exploitation of halibut-liver oil in the field of human nutrition, there has been an increasing interest in new sources of natural concentrates of vitamins A and D. Working on the premise that vitamin storage in fish may be a function of age, the Bureau began an investigation of the oil obtainable from the liver of the swordfish taken commercially on Georges Bank and adjacent fishing banks off the coast of New England.

Livers were procured and investigated from the standpoint of oil content and the nature of the oil present. Analysis showed that the moisture content of the liver varied between 60 and 68 percent; oil content, between 13 and 22 percent; and flesh residue, between 15 and 24 percent. The oil was a dark viscous fluid which solidifies at relatively high temperatures.

Samples of oil, examined colorimetrically, indicate that swordfish-liver oil is an extremely potent carrier of vitamins A and D. Several experimental methods of preparing the oil were studied. The vitamin tests of swordfish-liver oil, described later on in this report, indicated that solvent extraction methods yielded an oil of higher vitamin potency than oil extracted from the livers by mechancial processes.

CONTROLLING THE OXIDATION OF FISH OILS

Fish oils are composed of glycerides of saturated and unsaturated fatty acids. The unsaturated fatty acids have the ability to take up oxygen from the air and, when spread in a thin layer, form a relatively tough, protective film. This is known as drying, and constitutes the value of drying oils in paints. Where fish oils are used for other than their drying properties, their ability to take up oxygen proves a handicap since oxidation leads to thickening and the acquiring of an undesirable odor and taste. When oils are winterized or cold pressed in order to give them the property of remaining fluid and clear at low temperatures, the proportion of unsaturated fatty acids to saturated fatty acids is increased, with the resultant tendency for them to have a greater faculty for taking up oxygen. Certain chemical compounds, when mixed with an oil of this nature, have the ability to retard oxidation. These are known as antioxidants or inhibitors, and should have usefulness in stabilizing the keeping properties of fish oils in certain uses. With this in mind, the Bureau has undertaken an investigation of the use of antioxidants in fish oils. The work which has just begun will be continued during the coming year.

NUTRITIVE VALUE OF FISHERY PRODUCTS

Since we are dealing fundamentally with a food industry and, therefore, since our technological investigations constitute a highly specialized field of food research, obviously the nutritive or food value of fishery products is of primary importance. This applies not only to the fishery products of current commerical importance, but also applies to any experimentally manufactured products resulting from studies of improvements in manufacture, preservation, handling, storage, and marketing. In other words, the consumer is not only interested in the fishery products now on the market and available for human nutrition and in the byproducts now available for animal nutrition, but he is interested in any improvements that can be made in these products by experimental work. It naturally follows that quality and increased food value are the measurements of any improvements which can be made in the products of this industry. For this reason, our nutrition experiments play an extremely important and vital role in our program of technological investigations, viewing these integrated phases of our technological program as a coordinated whole. Therefore, our nutrition tests serve two important functions. The first function of nutrition studies is to determine the quality and food value of current fishery products of commerce. The second function of this work is to provide a yardstick for evaluating improvements in methods of manufacture, preservation, handling, storage, and marketing, in terms of the quality and food value of the finished products of these experimental methods as compared with the finished products of commercial methods now in use.

During the past year various phases of our program of nutrition research were carried out in our laboratories in Washington, D.C., and in the State laboratory at Charleston, S.C., by the following members of our technological staff: E. J. Coulson, Charles F. Lee, and C. D. Tolle.

SWORDFISH-LIVER OIL

Recently the Bureau announced in a press release the results of studies made by members of its technological staff in connection with the vitamin content of swordfish-liver oil and the developments of methods of production of swordfish-liver oil of high vitamin potency. This work was performed in the Division's technological laboratories located in Gloucester, Mass., Washington, D. C., and Seattle, Wash., by the following members of our technological staff: Roger W. Harrison, S. R. Pottinger, Andrew W. Anderson, and Charles F. Lee. Certain details concerning the swordfish-liver oil investigation have been discussed in a previous paragraph of this report under the heading of "Preservation of Fishery Byproducts." The nutrition tests in our Washington laboratories revealed that swordfish-liver oil contains from 75 to 100 times as much vitamin D as the United States Pharmacopoeia standard reference cod-liver oil, and from 15 to 25 times as much vitamin A as this standard cod-liver oil. Since the United States Pharmacopoeia standard reference cod-liver oil contains about 3,000 international vitamin A units and 95 international vitamin D units, this means that swordfish-liver oil contains from 45,000 to 75,000 international vitamin A units, and from 7,000 to 9,500 international vitamin D units. According to these results, while swordfish-liver oil is not as rich as halibut-liver oil in vitamin A content, it is many times higher in vitamin D.

OILS FROM SALMON CANNERY TRIMMINGS, SALMON EGGS, AND SALMON LIVERS

During the past year, our Washington Nutrition Laboratory continued vitamin assays of various oils experimentally prepared by our byproducts section from salmon cannery trimmings, salmon eggs, and salmon livers. The results of our vitamin assays to date have shown that salmon-liver oils are approximately 5 to 20 times as potent in vitamin A and approximately 2 to 3 times as potent in vitamin D as an average medicinal cod-liver oil. The oils prepared from salmon eggs varied considerably, although these compared favorably in vitamin potency with an average medicinal cod-liver oil. The same is, in general, true of oils from cannery trimmings.

MINERAL CONSTITUENTS OF FISHERY PRODUCTS

Much has been written in the scientific literature in recent years concerning the increasing importance of minerals in nutrition. Probably no other class of foods offers so attractive a field of study, in this respect, as fishery products since it is commonly known that these products contain minerals in quantity and variety, many of which have been shown by scientific investigators to be of great importance in both human and animal nutrition. In the State laboratory at Charleston, S.C., E. J. Coulson, a member of our technological staff, has been making an extensive study of the nutritive value of minerals in fishery products. Chemical analyses of the quantity of these minerals in various fishery products of commercial importance are being made. Following this, these fishery products are fed to laboratory animals to determine the biological value of such minerals. It is hoped that later on it may be possible to extend these mineral nutrition studies to patients in the State hospital or medical clinic in Charleston. While this study, because of its large scope, will necessarily require many years for completion, certain portions of it have been completed and the following reports have been prepared for publication by the Bureau: "The Iodine Content of Oysters", published as Bureau of Fisheries Memorandum S–334; "Studies on the Nutritive Value of Oysters", published as Fisheries Investigational Report No. 17; and "The Oyster as a Source of Minerals", a report yet to be published. The above investigation has included other fishery products as well as oysters, but the work has not sufficiently progressed that reports on these commodities can yet be prepared.

DEVELOPMENTS AND IMPROVEMENTS OF FISHING GEAR

As stated previously in this report, certain of our technological and marketing investigations are of vital importance in any broad program of conservation of our fishery resources. There are few other fields of investigation which offer any greater opportunity for contributing to real conservation than developments and improvements in the various types of fishing gear which are used in the actual catch of fish.

MEASUREMENT OF MESH SIZE OF FISHING NETS

For many years, there have existed in various parts of the country numerous controversies between the conservation authorities of the States involved and interested parties in the fisheries, concerning the mesh size of fishing nets used in the various waters of those States. These disputes are, in themselves, indicative of the great importance of the size and type of fishing nets as an influence on conservation measures. The mesh size of nets determines the kinds and numbers of undersized and immature fish which will be permitted to escape from the commercial fisherman and, in the interests of conservation, contributes to the maintenance of the fisheries. Therefore, our technologists, as well as our biologists, have cooperated with the States and with the industry on this great problem. In this connection, during past years, technologists of this Bureau and of the Bureau of Standards have made a study of devices to enable the conservation authorities of the States to establish and apply uniform enforcement of these mesh sizes of nets. However, during 1933, due to limitations of appropriations in this Bureau and in the Bureau of Standards, this investigation had to be suspended temporarily.

NET PRESERVATION

The development of and tests of commercial preservatives for fishing nets were continued during 1933 by W. T. Conn, a member of the Division's technological staff. The work followed two principal objectives, one to confirm previous season's tests and the other to test new formulas developed. Several years ago, our technologists discovered that the greatest menace to fishing nets in fresh water consisted in attacks on the netting by cellulose digesting bacteria. In addition to recommendations for treating these nets with toxic dyes, as described in previous annual reports of this Division, it has been found during the past year that chrome tanning of the cotton netting is superior to these previously developed dye processes and that, where bacterial action is not serious, an improved method of cutching twine produces good service. In all cases, better results are obtained by covering the treated nets with a good grade of tar, properly applied, in addition to one of the above treatments.

Another serious problem in net deterioration has been the fouling of nets by weeds and other marine growth after the nets have been in waters for varying lengths of time. Studies of this problem have revealed that certain mercury compounds are valuable in checking these growths.

Other chemicals tested out during the past year, of value in net preservation, include various antioxidants. It has been found that the inclusion of antioxidants in tar for treating nets is an improvement over plain tar treatments, since the antioxidants increase the flexibility of the tarred net, thereby prolonging its useful life. A detailed study has been made of the effect of exposing cotton and linen twines to rain and comparing these stocks dried in sunshine and in the shade. The sun-dried twines deteriorated very rapidly. The shade-dried linen deteriorated slightly in 6 months, but the cotton twine gained in strength. In these tests, it was found that even a small amount of soft coal smoke was very destructive to both linen and cotton twines.

During the past year, our technological staff cooperated with the Bureau of Construction and Repair of the Navy Department in developing chemical preservatives for manila cordage. It was found that antioxidants were of value in prolonging the life of linen cordage or rope. This work will result in considerable savings to the Navy Department since this Department naturally uses large quantities of this material.

During 1933, we issued a pamphlet entitled "More Life from Fish Nets", by W. T. Conn. This pamphlet proved to be very popular and hundreds of fishermen have written in for copies of it. In order to reach the fishermen of the country so that they could take advantage of the recommendations in this pamphlet, notices were sent to post offices where fishermen receive their mail and to small town newspapers. The interested response on the part of the fishermen was most gratifying.

EDUCATIONAL AND CONSULTING SERVICES

In addition to the activities previously described, our technological staff conducts very important educational and consulting services for those interested in the fisheries. Some of these educational functions and consulting services have been discussed or referred to in preceding paragraphs of this report. Therefore, it is only necessary to summarize these services and to describe their nature. We have cooperated with various State institutions, colleges, universities, schools, and other public institutions in disseminating information on the preservation, utilization, food value, etc., of fishery products. This has been done by means of lectures, practical demonstrations, radio addresses, letters, and reports. The members of our Division staff also prepare answers to letters or inquiries received by the Bureau from persons and companies interested in various industrial problems in the fisheries. These inquiries contain questions on the various problems connected with the manufacture, preservation, handling, storage, statistics, and marketing of the products of the fisheries. This correspondence is answered by reference to our published literature and the publications of other institutions of fishery research, from the information contained in the Bureau of Fisheries' Library, and from the knowledge and experience of the various technologists. The replies to these inquiries constitute a technological consulting service conducted by the Bureau for the benefit of the public.

Our technological publications and activities have attracted students to Washington, in recent years, from all parts of the world. Among those visiting our technological laboratories in Washington and elsewhere in the United States, during 1933, were students, scientific investigators, and members of the faculties of foreign universities from the following countries: England, France, Norway, Japan, Egypt, Argentina, and the Philippine Islands.

MARKETING INVESTIGATIONS

As indicated earlier in this report, the great need of the fishery industry today is marketing reform. Almost every conceivable system of marketing known is used in the fisheries. Considerable confusion and disorganization exist, permitting many practices which react unfavorably against the industry. Present marketing conditions in the industry are permitting the distribution and introduction to the public of inferior merchandise. This inferior merchandise unquestionably acts as a deterrent in any efforts to increase the consumption of fishery products in this country, and reacts against the industry as a whole. There is no intention here to be unduly critical of members of the industry. In fact, only constructive criticism is offered. It is recognized that there are many able and progressive individuals and firms in the fishery industries and some of the products of the industry are merchandise of high quality. However, a small amount of inferior merchandise can do more harm than the good accomplished by a large amount of good merchandise. It is a well-known fact that the United States has a lower annual per capita consumption of fishery products than most of the important nations of the world. This is not, by any means, entirely caused by the fact that we are primarily an agricultural nation, but is largely influenced by the lack of quality and standards of quality in the marketing of fishery products and the great confusion existing among producers, dealers and consumers, as to the intrinsic value of the products they are handling. It is recognized that there is justification for a greater "spread" in prices between producer and consumer in this industry, on account of the high rate of perishability of its products, but there is no permanent reason or excuse for the "spread" which exists under present conditions of marketing. The Bureau realizes that the needed marketing reforms cannot be accomplished overnight, but that to be successful they must be based on fundamental and thorough surveys of present conditions in the industry and recommendations to be made only after thorough studies founded on sound principles of economics.

THE SHRIMP INDUSTRY

An economic survey of the shrimp fishery and industry of the South Atlantic and Gulf States was made during 1933 by Fred F. Johnson of the Division of Fishery Industries and Milton J. Lindner of the Division of Scientific Inquiry.

It was brought out that the catch of shrimp in the South Atlantic and Gulf States in 1931 amounted to 96,451,000 pounds, with a value to the fishermen of $2,730,000. This represents 97 percent of the volume and 95 percent of the value of the catch of the shrimp fisheries of the United States and Alaska. This fishery gave employment to more than 14,000 persons as fishermen and workers in wholesale and manufacturing establishments.

The prosecution of this fishery and the packing and allied industries it supports, furnish the livelihood of many entire southern communities and contribute an important food product to the domestic and foreign trade of this country. Thus, it is essential that proper steps be taken to assure the future supply of this crustacean and that there be technological development of fishing and plant operation, and improved business methods, in order that normal activities in the industry may be expected not only in the immediate, but in the more distant, future as well.

These essentials of the industry require the concerted attention and efforts of the shrimp interests. Organization should lead to a development of statistical procedure that can definitely point out when and where depletion of the fishery may be imminent and remedial action be taken in time. It should foster research to improve fishing boats and gear, methods of handling, improvement of the finished product, marketing methods, and endeavor to establish new markets; and it should evolve a definite and adequate cost of production system to be followed by its members that they may know in what department their costs are excessive, and further that they may be able to price their goods to make a fair profit.

The paper which will publish the results of this survey will include for the South Atlantic and Gulf States the following sections among others: Natural history; fishing grounds; the fishermen; plant workers; methods of capture; craft used in capture; seasons of capture; preparation for market; marketing; prices; nutritive value; and data for foreign shrimp fisheries and markets.

THE RED SNAPPER INDUSTRY

During 1933, Norman D. Jarvis, assistant technologist, completed his investigation of the red snapper industry which was begun in 1932. The results of this study have been summarized in a report entitled "Fishery for Red Snappers and Groupers in the Gulf of Mexico", which the Bureau expects to publish during the coming year. This report contains information on gear, equipment, etc., used in the red snapper fishery and in the preparation, handling, and shipment of products of this fishery. It contains recommendations as to methods for smoking red snapper and grouper and suggestions with respect to other methods of preservation and handling.

MARKETING GRADES OR STANDARDS FOR FISH AND FISHERY PRODUCTS

At the request of various States, the Division has undertaken a study of the possibilities for establishing and applying voluntary marketing grades or standards for fishery products. This work has been under the direction of John Ruel Manning, chief technologist. The studies have been made in cooperation with several States on the products in those States. The work was begun over a year ago in Virginia by J. H. Meek, director, and N. W. Broome, supervisor, Virginia Division of Markets, and Mr. Manning of this Division. The experience of the past year in Virginia has shown that these marketing grades or standards are practical and have been successful in improving the economic condition of producer and dealer.

Consumers are much better satisfied, since they recognize in these grades dependent standards of quality. As pointed out in the Division's report for 1932, marketing standards have been very successful with all kinds of agricultural products. In addition to our work in Virginia, we have cooperated with other States during 1933 in the study of this marketing problem. Among the States where actual studies have either begun or where considerable interest is being shown are North Carolina, Massachusetts, Maryland, and New Jersey.

During 1933, in connection with the formulation of fishery codes, Mr. Manning prepared several reports on the standardization or grading of fishery products, based on his brief surveys, for the National Recovery Administration and the Agricultural Adjustment Administration. Considerable interest has been shown in this work by consumers. The Consumers' Advisory Board of the National Recovery Administration has used considerable of the material from our reports in its efforts to develop consumer's standards.

From our investigations to date, it appears that a national and uniform system of voluntary grading and standardization is practical and will be of considerable aid ultimately to the entire fishery industry. It will be a great contribution to conservation in keeping undersized and immature fish from the market and in eliminating waste. It would tend to stabilize the industry, cut down merchandising costs, would assist materially in the prevention of destructive price cutting, would facilitate the procurement of necessary credit by fishing enterprises from banks and other financial institutions, would assist in the elimination of evils of the consignment business, would increase the consumption of fishery products, and would be of general benefit to the producer, dealer, and consumer. It cannot be emphasized too strongly that marketing reforms in the fisheries are vital to any conservation program in the fisheries.

INTERCHANGEABILITY OF THE USES OF OILS AND FATS—FISH OILS

Because of the extremely depressed economic condition of the oils and fats industry in this country, and its direct effect on fish oils and other marine animal oils, the Division gave considerable thought and study to this problem. In fact, studies of the economic and marketing conditions of the fish-oil industry have engaged the attention of our division staff for the past several years. Recently, at the request of the Finance Committee of the United States Senate, John Ruel Manning, chief technologist, made a study of the technical and economic conditions in this industry, and prepared a brief summary concerning the interchangeability of the uses of oils and fats, with special reference to fish and marine animal oils. The summary is given below.

The information given herewith deals only with saponifiable oils and fats and does not pertain to the petroleum or mineral-oil industry.

The interchangeability of the uses of oils and fats in commerce and in the various industries involves both technical and economic considerations. From a technical standpoint, there can be and is free interchangeability of the uses of various oils and fats. Modern methods of hydrogenation, refining, treatment, etc., make it possible to prepare practically all oils and fats for almost any industrial use.

This means that it is possible, chemically, to use practically any animal or vegetable oil or fat in soap manufacture or in some of the other possible consuming industries of these commodities. Therefore, the actual practice of the interchangeability of the uses of oils and fats is a matter of prices or other economic considerations. Formerly, certain technical and economic obstacles prevented any great interchangeability. At the present time, certainly no technical obstacles exist, and it is doubtful that there are many economic obstacles which would hinder complete potential interchangeability.

It is quite true that the specifications of the finished product may to a certain extent govern interchangeability. However, in many instances, favorable economic influences will overcome even these requirements or specifications.

The statement is quite often made that this or that particular oil or fat is not suitable for the manufacture of soap or other finished products, because of the relatively high or low content of the particular oil or fat in some specific fatty acid. This statement is not true for the following reasons: Animal and vegetable fats and fatty oils are of similar general composition since they are mixtures of compounds of glycerin and certain organic acids, which, due to their presence in fats, are called fatty acids. Obviously, the variable in the composition of these materials is the fatty acid portion. For this reason, the properties of the various fats and oils, and consequently their desirability for a particular use, depend primarily upon their constituent fatty acids and the proportion of these various acids present. This situation applies to all oils and fats, both marine animal, terrestrial animal, and vegetable. Without making the discussion too involved, it is a known fact among chemists and technologists that developments in hydrogenation processes have made it possible to convert unsaturated liquid oils to any desired degree of hardness. Consequently, the apparent difference in the natural qualities of various fats and oils has resolved itself into little actual difference insofar as the possibilities for the interchangeability of these materials is concerned, or where hard fats are required for the particular use in question. It is, therefore, readily seen that, whenever economic considerations enter into the industrial picture, or in other words, when the price of a particular oil or fat is relatively low, it is quite often advantageous and economically attractive to substitute as an ingredient of the finished product a cheaper oil or fat than the one formerly used. It is commonly known among those familiar with the uses of oils and fats that such substitution or interchangeability is actually practiced in the consuming industries whenever market conditions are sufficiently favorable.

Statistics show that there is a world surplus of oils and fats. There is a domestic surplus of oils and fats for nearly all domestic uses. With the great possibilities for the interchangeability of the uses of these oils and fats as discussed above, it is readily apparent that a highly complicated and competitive market for these raw materials exists. Even though a particular oil or fat, because of some special natural property, is favored for certain specific uses, this specific oil or fat will be affected either directly or indirectly by changes in the market for these commodities as a whole. In other words, if the supply of oils or fats intended for shortenings, for other edible use, for a source of vitamins for use in either human or animal nutrition, is more than the market can absorb, this oil or these oils and fats will affect and be affected by the supply and demand for other oils for other uses. Since the soap kettle is the principal consumer of oils and fats, it is probably one of the important, if not the most important, factors affecting the general market situation for these commodities. If an oil or fat is especially desired for some particular use and is commanding a higher price for that use than it would command for soap manufacture, and cannot find a market for this higher priced use, it will gravitate to the market for soap manufacture.

This is just one example of how the possible and actual interchangeability of the uses of various oils and fats can and does affect markets and prices for each and every type of oils and fats under conditions of a world surplus and a domestic surplus of oils and fats.

PUBLICATIONS OF THE DIVISION

During the calendar year 1933 the following publications were prepared by members of the Division's staff. These do not include the monthly statistical bulletins of the landings of fishery products at Boston and Gloucester, Mass., Portland, Me., and Seattle, Wash., nor the monthly reports on cold-storage holdings of frozen fish and quantities of fish frozen. The fishery documents, reports, and circulars may be purchased at the prices shown from the Superintendent of Documents, Government Printing Office, Washington, D.C. The statistical bulletins and special or S–memoranda are distributed free of charge upon request to the Bureau. The special articles may be obtained from the sources of publication.

Those wishing to receive current copies of this report and statistical bulletins issued by the Bureau should request that their names be placed on the Bureau's mailing lists no. 128 for the Annual Statistical Report, 128a for general statistical bulletins, and 128b for monthly cold-storage reports. Those desiring historical statistical data on the domestic fisheries for the period 1880 to 1929 should consult the report entitled "Fishery Industries of the United States, 1930" by R. H. Fiedler, Appendix II to the Report of the United States Commissioner of Fisheries for the fiscal year 1931.

DOCUMENTS, REPORTS, AND CIRCULARS

COULSON, E. J.
Studies on the nutritive value of oysters. 8°, 30 pp., 8 figs. Investigational Report No. 17. 5 cents.

FIEDLER, R. H.
Fishery industries of the United States, 1932. Appendix III, Report of Commissioner, 1933. 8°, 301 pp. 20 cents.

SPECIAL ARTICLES

ANDERSON, A. W., ROGER W. HARRISON.
A survey of the fishery byproducts industry of Maine. Fishing Magazine, November 1933, December 1933, and February 1934. New York City.

CONN, W. T.
Net preservative research, 1932, with recommendations. Bureau of Fisheries Memorandum S–330, January 27, 1933. Published in Fish and Oyster Reporter, March 1933, Tampa; Atlantic Fisherman, April 1933, Goffstown; Cord Age, May–June 1933. New York City.

Atmospheric exposure of linen and cotton with special reference to fish nets. Bureau of Fisheries Special Memorandum 1651–G, November 21, 1933. Published in Fishing Magazine, November 1933, New York City, and Fish and Oyster Reporter, December 1933. Tampa.

Conn, W. T.—Continued.
The tanning or barking of nets. Bureau of Fisheries Memorandum S-333, December 16, 1933.
More life from fish nets. Bureau of Fisheries Special Memorandum 1651-H, December 26, 1933.
Coulson, E. J.
The iodine content of oysters. Address before the Medicinal Chemistry Section, American Chemical Society, Washington, D.C., March 27, 1933. Bureau of Fisheries Memorandum S-334.
Nutritive value of oysters. Fishing Gazette, August 1933, New York City. Bureau of Fisheries Special Memorandum 2468-C.
Fiedler, R. H.
Problems in the marketing of fishery products in the United States. Fish and Oyster Reporter, January 1933. Tampa.
Jarvis, Norman D.
Fish as food. Address before First District Conference, Florida State Chamber of Commerce, Apalachicola, Fla., April 29, 1933. Published in Fish and Oyster Reporter, July 1933. Tampa.
Method for smoking fish in the Southern States, with recipes for cooking. Bureau of Fisheries Memorandum S-331, July 1933.
Method for dry salting fish in the Southern States, with recipes for cooking. Bureau of Fisheries Memorandum S-332, October 1933.
Johnson, F. F., W. H. Brown.
Retailing 'em alive in Miami and New Orleans. Fishing Gazette, March 1933. New York City.
Manning, John Ruel.
Look to the sea for your diet. Lecture delivered to class of dietitians at Army Veterinary School, Army Medical Center, Washington, D.C., on February 6, 1933. Bureau of Fisheries Special Memorandum 1061-A.
Nutritive value of marine products. Lecture delivered at Western Maryland College, Westminster, Md., March 21, 1933. Bureau of Fisheries Special Memorandum 2468-B.
Technological investigations in the fisheries. Lecture delivered to class of students in aquiculture and zoology, University of Maryland, College Park, Md., April 4, 1933. Bureau of Fisheries Special Memorandum 2520.
Fish meal in animal feeding. Paper presented before Fisheries' Section of the Fifth Pacific Science Congress in Vancouver, Canada. June 8, 1933. Published by His Majesty's Printing and Stationery Office, London, England.
Fish oils are a form of national health insurance. Published in United States News, September 16, 1933.
Fish flour as nutritive food for economy diet. Published in United States News, September 23, 1933.
The vital importance of establishing marketing grades or standards for fish and fishery products in the United States. Bureau of Fisheries Special Memorandum 2450-E.
Standardization of fishery products. Address delivered before the 15th Annual Meeting of The National Association of Marketing Officials, Washington, D.C., December 20, 1933. Bureau of Fisheries Special Memorandum 2450-H.
Stansby, Maurice, James M. Lemon.
An electrometric method for detection of relative freshness of haddock. Analytical Edition, Industrial and Engineering Chemistry, vol. 5, p. 208, May 15, 1933. Bureau of Fisheries Special Memorandum 2511.

STATISTICAL BULLETINS

Fisheries of the New England States, 1931. Statistical Bulletin No. 1030.
Fisheries of the Middle Atlantic States, 1931. Statistical Bulletin No. 1015.
Fisheries of the Chesapeake Bay States, 1931. Statistical Bulletin No. 1012.
Fisheries of the South Atlantic and Gulf States, 1931. Statistical Bulletin No. 1028.
Fisheries of the Pacific Coast States, 1931. Statistical Bulletin No. 1027.
Fisheries of the United States and Alaska, 1931. Statistical Bulletin No. 1032.
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Production of fresh and frozen packaged fish in the United States, 1932. Statistical Bulletin No. 1023.
Canned fishery products and byproducts of the United States and Alaska, 1932. Statistical Bulletin No. 1026.
Fisheries of Alaska, 1932. Statistical Bulletin No. 1034.
Landings by fishing vessels at principal New England ports, 1932—By months. Statistical Bulletin No. 1016.
Landings by fishing vessels at the three principal New England ports, 1932—By gear and fishing grounds. Statistical Bulletin No. 1017.
Fishery products landed by United States fishing vessels at Seattle, Wash., 1932. Statistical Bulletin No. 1029.

Part 2. FISHERY STATISTICS, 1932

GENERAL REVIEW

The catch of fishery products in the United States and Alaska during 1932 decreased slightly from that in the previous year, the decrease amounting to 1 percent in quantity; however, the value decreased 27 percent. The value of the production of canned fishery products decreased 31 percent as compared with that in the previous year; and byproducts decreased 25 percent. There were also decreases in the production of packaged and frozen fish products. There was a decrease of 31 percent in the value of imports and 33 percent in the value of exports as compared with 1931.

During 1932 the domestic fisheries employed about 116,000 persons as fishermen. The catch amounted to 2,614,140,000 pounds, valued at $54,764,000. In addition, the fishery for seed oysters showed a production of 3,076,000 bushels, valued at $768,000.

In 1932 in the United States and Alaska, the production of canned fishery products amounted to 416,062,000 pounds, valued at $43,-749,000 and the output of byproducts was valued at $12,466,000. The production of fresh and frozen packaged fish (exclusive of packaged shellfish) amounted to 51,976,000 pounds, valued at $5,741,000, while the pack of frozen fishery products amounted to 92,472,000 pounds, estimated to be valued at $7,000,000.

Fishery products imported for consumption were valued at $29,566,000, and domestic exports were valued at $7,808,000.

New England States.—The 1932 statistics for the catch of these States showed a decrease in volume as compared with any year for which there are records since 1924, and a decrease in value as compared with any year since 1902. The landings of fish by vessels at Boston and Gloucester, Mass., and Portland, Maine, showed a considerable decrease under 1931. The production of frozen fish decreased about 4 percent.

Middle Atlantic States.—The catch of fishery products of the Middle Atlantic States in 1932 was less in both volume and value than in any preceding year for which data are available. The landings of fish at New York, N.Y., and Groton, Conn., decreased sharply under 1931 landings. There was a decrease in the production of both packaged and frozen fish. The catch of shad in the Hudson River increased appreciably in 1932 over 1931.

Chesapeake Bay States.—In 1932 the catch of fishery products in the Chesapeake Bay States was greater than that in any year since 1920 for which there are records, but the value of the 1932 catch was less than that for any year for which there are records since 1888. There was a large increase in the catch of croakers and menhaden.

South Atlantic and Gulf States.—The catch of fishery products of the South Atlantic and Gulf States in 1932 showed a small increase over that of 1931, but the value was less than in any year since 1902. There was a decrease in the production of canned shrimp and an increase in the output of canned oysters and menhaden products.

Pacific Coast States.—The catch statistics of the Pacific Coast States for 1932 showed the smallest catch since 1926, and a value less than in any year for which there are records since 1915. There were decreases in the packs of canned sardines, canned salmon, canned tuna, and frozen fish.

Lake States.—The United States fisheries prosecuted in the Great Lakes and the international lakes of northern Minnesota in 1932 decreased somewhat under the previous year. Beginning in 1929 a revised statistical procedure was used, including certain products not canvassed in some of the preceding surveys, and there was a change in the methods of collecting statistics in some of the States.

Mississippi River and tributaries.—The most recent complete catch statistics of the fisheries of the Mississippi River and tributaries are those collected for the year 1931. As compared with the 1922 survey, there was a decrease in the catch which was reflected principally in a smaller catch of fresh-water mussels. These are used primarily in pearl-button manufacture.

Alaska.—The catch of fishery products in Alaska in 1932 was slightly greater in volume due to the resumption of whaling but less in value than that in 1931. The pack of canned salmon in 1932 was less than that of the previous year. There was a decrease in the amount of frozen fish and an increase in the amount of cured fish and byproducts.

Fisheries of the United States and Alaska, 1932 [1]

SUMMARY OF CATCH: BY SECTIONS

[Expressed in thousands of pounds and thousands of dollars; that is, 000 omitted]

Product	New England, area XXII		Middle Atlantic, area XXIII		Chesapeake, area XXIII		South Atlantic and Gulf, areas XXIV and XXV		Pacific	
	Quantity	*Value*	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
Fish	440,918	9,184	112,302	1,938	267,107	2,548	184,158	2,715	542,859	8,416
Shellfish, etc	39,603	4,817	28,919	2,716	91,900	3,357	115,759	3,713	17,032	1,052
Whale products									937	16
Total	480,521	14,001	141,221	4,654	359,007	5,905	299,917	6,428	560,828	9,484

Product	Lakes		Mississippi River and tributaries		Alaska		Total	
	Quantity	*Value*	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
Fish	81,829	4,304	44,062	2,258	595,943	6,813	2,269,178	38,176
Shellfish, etc	1,915	28	38,320	640	2,913	158	336,861	16,481
Whale products					7,664	91	8,601	107
Total	83,744	4,332	82,382	2,898	606,520	7,062	2,614,140	54,764

[1] All figures are for 1932, except those for the Mississippi River and tributaries, which are for 1931.

NOTE.—The above excludes the seed-oyster fishery. See separate section following. The roman numerals appearing under the names of the sections are the numbers given these areas by the North American Council on Fishery Investigations. It should be explained that there are included under these areas craft owned under the respective areas but at times fishing elsewhere.

Fisheries of the United States and Alaska, 1932—Continued

OPERATING UNITS: BY SECTIONS

Item	New England	Middle Atlantic	Chesapeake	South Atlantic and Gulf [2]
	Number	*Number*	*Number*	*Number*
Fishermen:				
On vessels	5,142	2,862	2,056	2,409
On boats and shore	11,330	5,508	18,890	19,151
Total	16,472	8,370	20,946	21,560
Vessels:				
Steam	24	8	19	
Net tonnage	3,988	1,600	2,021	
Motor	594	407	110	441
Net tonnage	16,984	6,616	1,768	6,646
Sail	2		193	71
Net tonnage	53		2,005	841
Total vessels	620	415	322	512
Total net tonnage	21,025	8,216	5,794	7,487
Boats:				
Motor	4,604	1,593	8,216	5,052
Other	3,791	2,046	6,014	7,797
Accessory boats	1,212	48	52	85
Apparatus:				
Haul seines	84	331	302	891
Purse seines	179	22	27	42
Otter trawls (including all types and sizes)	523	179	27	1,680
Gill nets	11,081	2,399	11,811	10,860
Trammel nets				358
Pound nets, trap nets, and weirs	517	642	2,674	1,737
Stop nets		116	7	7
Fyke nets	349	3,100	1,873	1,085
Bag nets and pocket nets	108			
Other nets [4]	391	396	2,872	2,062
Hooks, baits, or snoods	3,758,823	735,884	1,372,819	324,694
Fish wheels				21
Eel pots and traps	5,136	6,995	9,654	1,325
Lobster pots	341,595	44,653		
Crab and crawfish pots, traps, drags, etc	8,351	50		4,635
Clam dredges	79	90		1
Crab dredges		67	126	
Mussel dredges		2		
Oyster dredges	114	360	794	577
Scallop dredges and drags	3,949	955	610	64
Crab scrapes			1,036	
Tongs, rakes, hoes, forks, picks, grabs, etc	4,441	2,813	12,321	2,920
Sponge diving outfits				54
Other apparatus [5]	3,275	177		2,593

Item	Pacific	Lakes	Mississippi River and tributaries	Alaska	Total
	Number	*Number*	*Number*	*Number*	*Number*
Fishermen:					
On vessels	6,132	1,705		[3] 8,059	28,365
On boats and shore	11,750	5,227	15,884		87,740
Total	17,882	6,932	15,884	8,059	116,105
Vessels:					
Steam	4	106		4	165
Net tonnage	106	2,364		276	10,355
Motor	928	392		442	3,314
Net tonnage	24,219	4,055		6,088	66,376
Sail	5				271
Net tonnage	2,107				5,006
Total vessels	937	498		446	3,750
Total net tonnage	26,432	6,419		6,364	81,737

[2] Includes the operating units used in the fisheries of Lake Okeechobee, Fla.
[3] Includes persons in boat and shore fisheries.
[4] Includes dip nets, scap nets, reef nets, push nets, and other minor nets.
[5] Includes fish pots; harpoons; spears; gaffs; crab, sponge, and crawfish hooks; periwinkle and cockle pots; coquina scoops; and other apparatus not included in "Other nets."

Fisheries of the United States and Alaska, 1932—Continued

OPERATING UNITS: BY SECTIONS—Continued

Item	Pacific	Lakes	Mississippi River and tributaries	Alaska	Total
	Number	*Number*	*Number*	*Number*	*Number*
Boats:					
Motor	5,028	1,624	4,426	1,083	31,626
Other	1,001	1,535	10,120	3,055	35,359
Accessory boats					1,397
Apparatus:					
Haul seines	135	332	1,013	90	8,178
Purse seines	364			292	926
Lampara nets	184				184
Otter trawls (including all types and sizes)	2				2,411
Beam trawls	60			12	72
Paranzella nets	21				21
Gill nets	8,671	103,518	101	3,651	147,092
Trammel nets	50	226	518		1,152
Pound nets, trap nets, and weirs	330	9,259	374	363	15,896
Stop nets					130
Fyke nets	2,268	2,574	32,541		43,790
Bag nets and pocket nets					108
Other nets [4]	419		191	50	6,381
Hooks, baits, or snoods	1,230,999	960,513	2,459,179	([5])	10,842,911
Fish wheels	29			283	333
Eel pots and traps					23,110
Lobster pots					386,248
Shrimp nets and traps	438				438
Crab and crawfish pots, traps, drags, etc	24,877	2,910	18	900	36,741
Clam dredges					170
Crab dredges					193
Mussel dredges			440		442
Oyster dredges	4				1,849
Scallop dredges and drags					5,578
Crab scrapes					1,036
Tongs, rakes, hoes, forks, picks, grabs, etc	3,910	126	3,994		30,525
Abalone diving outfits	18				18
Sponge diving outfits					54
Crowfoot bars		360	4,480		4,840
Other apparatus [6]	76		3,781		9,902

CATCH: BY SECTIONS [7]

[Expressed in thousands of pounds and thousands of dollars; that is, 000 omitted]

Species	New England		Middle Atlantic		Chesapeake		South Atlantic and Gulf [8]		Pacific	
FISH	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
Albacore			18	([9])						
Alewives	3,572	19	2,295	15	21,405	117	6,664	42		
Amberjack	1	([9])					5	([9])		
Anchovies									299	3
Barracuda							4	([9])	2,927	156
Black bass					34	4	310	22		
Bluefish	648	52	4,767	163	911	46	2,131	78		
Blue runner or hardtail							163	2		
Bonito	45	2	1,036	27	56	3				
Bowfin							2	([9])		
Buffalofish							12	([9])		
Butterfish	2,262	100	3,862	143	3,897	114	56	1		
Cabio or crab eater					4	([9])	6	([9])		
Cabrilla									340	12
Carp	41	3	330	32	363	19	128	7	93	2
Catfish and bullheads	2	([9])	62	5	883	28	4,364	139	254	27
Cero							13	1		
Cigarfish							9	([9])		

[4] Includes dip nets, cast nets, scap nets, reef nets, push nets, and other minor nets.
[5] Number not determined.
[6] Includes fish pots; harpoons; spears; gaffs; crab, sponge, and crawfish hooks; periwinkle and cockle pots; coquina scoops; and other apparatus not included in "Other nets."
[7] Salt fish have been converted to the basis of round weight.
[8] Includes the catch of fish taken in Lake Okeechobee, Fla.
[9] Less than 500 pounds or dollars.

Fisheries of the United States and Alaska, 1932—Continued

CATCH: BY SECTIONS—Continued

[Expressed in thousands of pounds and thousands of dollars; that is, 000 omitted]

Species	New England		Middle Atlantic		Chesapeake		South Atlantic and Gulf		Pacific	
FISH—continued	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
Cod	86, 276	1, 725	7, 481	176	22	1	2	(9)	11, 746	128
Corbina									2	(9)
Crappie							405	12		
Crevalle							24	1		
Croaker	469	10	857	21	16, 014	278	4, 675	50		
Cunner	76	2								
Cusk	5, 173	67	135	2						
Dolphin							12	(9)		
Drum:										
Black	(9)	(9)	(9)	(9)	64	1	1, 077	21		
Red or redfish			48	1	39	1	2, 083	78		
Eels	961	57	738	75	335	21	65	2	(9)	(9)
Flounders	37, 489	1, 129	10, 376	311	1, 288	53	1, 396	54	11, 446	435
Flyingfish									40	1
Frigate mackerel			3	(9)			2	(9)		
Garfish							(9)	(9)		
Gizzard shad					105	2	19	(9)		
Goosefish	2	(9)	3	(9)						
Grayfish	27	(9)	8	(9)					851	13
Groupers							3, 302	67	19	1
Grunts							51	2		
Haddock	150, 468	3, 400	7, 613	207	(9)	(9)				
Hake	16, 942	209	303	5	31	1	10	(9)	29	(9)
Halibut	2, 417	257	45	6					24, 787	1, 112
Hardhead									111	8
Harvestfish or "starfish"					102	3	1, 077	12		
Herring, sea	38, 074	157	656	4					1, 549	17
Herring smelt	4	(9)								
Hickory shad					59	1	166	6		
Hogfish	3	(9)					30	1		
Horse mackerel									536	14
Jewfish							38	1		
Kingfish (California)									448	11
Kingfish or "king mackerel"							3, 301	120		
King whiting or "kingfish"	7	(9)	178	10	33	1	652	13		
Ladyfish							3	(9)		
Launce	24	1	37	(9)						
"Lingcod"									1, 528	42
Mackerel	60, 088	962	740	27	26	1			12, 474	95
Marlin									25	1
Menhaden	54	1	43, 194	73	195, 486	653	89, 346	132		
Minnows	6	(9)	3	1						
Mojarro							36	1		
Mullet			215	3	48	2	25, 087	417	23	1
Mummichog	4	(9)	110	7						
Muttonfish							203	9		
Paddlefish							1	(9)		
Permit							3	(9)		
Pigfish			1	(9)	33	1	129	2		
Pike or pickerel (jacks)			1	(9)	18	3	5	(9)		
Pilchard									312, 172	825
Pilotfish			1	(9)						
Pinfish							295	2		
Pollock	10, 635	103	662	11						
Pompano			(9)	(9)	(9)	(9)	590	81	10	3
Porgies							26	1		
Porkfish							(9)	(9)		
Rock bass									437	21
Rockfishes									5, 967	181
Rosefish	125	2	7	(9)						
Rudderfish									37	2
Sablefish									2, 725	63
Salmon:										
Atlantic	36	9								
Blueback, red or sockeye									6, 904	397
Chinook or king									33, 094	1, 350
Chum or keta									15, 846	126
Humpback or pink									69	1
Silver or coho									20, 176	520
Sculpin									90	6
Scup	4, 458	114	7, 516	88	1, 748	47	254	6		
Sea bass	3, 607	95	3, 353	103	960	28	704	24	473	17
Sea bass, white (California)									807	61

[9] Less than 500 pounds or dollars.

Fisheries of the United States and Alaska, 1932—Continued

CATCH: BY SECTIONS—Continued

[Expressed in thousands of pounds and thousands of dollars; that is, 000 omitted]

Species	New England		Middle Atlantic		Chesapeake		South Atlantic and Gulf		Pacific	
FISH—continued	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
Sea robin	116	1	32	(9)	(9)	(9)				
Shad	232	13	643	68	6,515	580	1,882	239	1,889	41
Sharks	245	2	21	(9)			5,051	12		
Sheepshead, salt-water							673	14	90	2
Silver perch					21	(9)				
Silversides			173	6						
Skates	949	7	79	1	1	(9)			292	5
Smelts	277	38	(9)	(9)					2,829	76
Snapper:										
Mangrove							96	2		
Red			6	(9)			6,359	315		
Snook							323	8		
Spanish mackerel			8	1	63	4	6,465	216	11	1
Splittail									24	1
Spot	22	(9)	154	3	801	24	1,679	20		
Squawfish									2	(9)
Squeteagues or "sea trout":										
Gray	132	9	9,088	211	13,780	339	3,992	74		
Spotted	2	(9)			11	6	6,239	298		
Steelhead trout									2,459	61
Striped bass	42	7	52	8	1,028	128	507	55	556	47
Sturgeon	8	1	11	2	5	1	45	6	76	2
Suckers	138	6	122	7	1	(9)	(9)	(9)	6	(9)
Sunfish			2	(9)			718	18		
Surffishes									253	10
Swellfish	(9)	(9)								
Swordfish	4,548	485	70	8					663	58
Tautog	446	19	161	5	(9)	(9)				
Tenpounder							80	1		
Thimble-eyed mackerel			68	1	12	(9)				
Tilefish	249	10	1,870	50						
Tomcod	56	1	24	1					4	(9)
Tripletail							2	(9)		
Tuna and tunalike fishes:										
Albacore									620	31
Bluefin or horse mackerel	256	12	59	3			3	(9)	1,071	51
Bonito									2,862	53
Skipjack or striped									21,637	751
Yellowfin									36,923	1,505
Turbot							4	(9)		
Whitebait			7	1					134	6
Whitefish									162	8
White perch	54	6	253	14	642	26	832	21		
Whiting	7,201	61	2,705	31						
Wolffish	1,933	29	25	(9)						
Yellow perch	16	1	15	1	185	11	180	5		
Yellowtail							92	4	1,796	51
Miscellaneous fish									166	4
Total	440,918	9,184	112,302	1,938	267,107	2,548	184,158	2,715	542,859	8,416
SHELLFISH, ETC.										
Abalone									563	77
Clams:										
Cockle	238	16							37	9
Coquina							5	(9)		
Hard	3,459	422	2,271	355	1,512	352	1,387	61	406	20
Pismo									27	7
Razor	404	17							559	115
Soft	10,145	472	1,196	62					61	14
Surf	55	3	489	25						
Mixed									15	2
Conchs			39	3			1	(9)		
Crabs:										
Hard	1,097	55	777	24	56,423	582	8,484	89	4,820	299
King			3,501	7						
Soft	1	(9)	85	11	5,089	320	413	60		
Stone							154	8		
Crawfish									80	6
Lobsters:										
Common	10,279	1,913	878	166	(9)	(9)				
Spiny							440	32	1,018	142

[9] Less than 500 pounds or dollars.

Fisheries of the United States and Alaska, 1932—Continued

CATCH: BY SECTIONS—Continued

[Expressed in thousands of pounds and thousands of dollars; that is, 000 omitted]

Species	New England		Middle Atlantic		Chesapeake		South Atlantic and Gulf		Pacific	
SHELLFISH, ETC.—continued	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
Mussels, sea	63	4	113	8					[9]	[9]
Octopus							1	[9]	59	3
Oysters:										
Eastern, market, public	44	7	303	37	18, 168	1, 251	11, 382	448		
Eastern, market, private	7, 343	1, 196	14, 724	1, 726	9, 722	765	4, 368	264	42	14
Western, market									270	139
Japanese, market									2, 103	129
Periwinkles	77	3	1	[9]						
Scallops:										
Bay	1, 537	402	393	42	659	80	153	14	7	2
Sea	1, 572	194	1, 772	140	[9]	[9]				
Shrimp	[9]	[9]	117	27			88, 262	2, 036	2, 729	44
Squid	3, 110	42	2, 220	34	323	6	8	[9]	4, 230	30
Terrapin			1	[9]	3	1	23	4		
Turtles	1	[9]	8	[9]	1	[9]	58	[9]	6	[9]
Frogs							1	[9]		
Irish moss	84	4								
Sponges							613	697		
Bloodworms	59	46	32	31						
Sandworms	35	21	19	18						
Total	39, 603	4, 817	28, 919	2, 716	91, 900	3, 357	115, 759	3, 713	17, 032	1, 052
WHALE PRODUCTS [10]										
Meat									434	10
Oil, whale									503	6
Total									937	16
Grand total	480, 521	14, 001	141, 221	4, 654	359, 007	5, 905	299, 917	6, 428	560, 828	9, 484

Species	Lakes		Mississippi River and tributaries		Alaska		Total	
FISH	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
Albacore							18	[9]
Alewives							33, 936	193
Amberjack							6	[9]
Anchovies							299	8
Barracuda							2, 931	156
Black bass			14	2			358	28
Bluefish							8, 457	339
Blue pike	9, 947	411					9, 947	411
Blue runner or hardtail							163	2
Bonito							1, 137	32
Bowfin	3	[9]	428	9			433	9
Buffalofish	2	[9]	15, 772	687			15, 786	687
Butterfish							10, 077	358
Burbot	331	4					331	4
Cabio or crab eater							10	[9]
Cabrilla							340	12
Carp	4, 284	118	11, 892	455			17, 131	636
Catfish and bullheads	833	46	10, 267	878			16, 665	1, 123
Cero							13	1
Chubs	4, 057	249					4, 057	249
Cigarfish							9	[9]
Cisco	160	17					160	17
Cod					615	3	106, 142	2, 033
Corbina							2	[9]
Crappie	1	[9]	41	3			447	15
Crevalle							24	1

[9] Less than 500 pounds or dollars.

[10] The weight of whales caught was not determined; therefore, the weight of the manufactured products is shown.

NOTE.—The above excludes the seed-oyster fishery. See separate section following.

Fisheries of the United States and Alaska, 1932—Continued

CATCH: BY SECTIONS—Continued

[Expressed in thousands of pounds and thousands of dollars; that is, 000 omitted]

Species	Lakes		Mississippi River and tributaries		Alaska		Total	
FISH—continued	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
Croaker							22,015	859
Cunner							76	2
Cusk							5,308	69
Dolly Varden trout					13	1	13	1
Dolphin							12	(9)
Drum:								
Black							1,141	22
Red or redfish							2,170	80
Eels	44	1	7	1			2,150	157
Flounders							61,995	1,982
Flyingfish							40	1
Frigate mackerel							5	(9)
Garfish			73	1			73	1
Gizzard shad							124	2
Goldfish	48	1					48	1
Goosefish							5	(9)
Grayfish							886	13
Groupers							3,321	68
Grunts							51	2
Haddock							158,081	3,607
Hake							17,315	215
Halibut					15,058	493	42,307	1,868
Hardhead							111	8
Harvestfish or "starfish"							1,179	15
Herring:								
Lake	11,686	181					11,686	181
Sea					127,578	548	167,857	726
Herring smelt							4	(9)
Hickory shad							225	7
Hogfish							33	1
Horse mackerel							536	14
Jewfish							38	1
Kingfish (California)							448	11
Kingfish or "king mackerel"							3,301	120
King whiting or "kingfish"							870	24
Ladyfish							3	(9)
Lake trout	10,662	920					10,662	920
Launce							61	1
"Lingcod"							1,528	42
Mackerel							73,328	1,085
Marlin							25	1
Menhaden							328,080	859
Minnows			1	(9)			10	1
Mojarro							36	1
Mooneye	16	(9)	3	(9)			19	(9)
Mullet							25,373	423
Mummichog							114	7
Muttonfish							203	9
Paddlefish			951	43			952	43
Permit							3	(9)
Pigfish							163	3
Pike or pickerel (jacks)	373	16	5	1			402	20
Pilchard							312,172	825
Pilotfish							1	(9)
Pinfish							295	2
Pollock							11,297	114
Pompano							600	84
Porgies							26	1
Porkfish							(9)	(9)
Quillback			269	11			269	11
Rock bass	17	1					454	22
Rockfishes					4	(9)	5,971	181
Rosefish							132	2
Rudderfish							37	2
Sablefish					128	2	2,853	65
Salmon:								
Atlantic							36	9
Blueback, red or sockeye					188,294	3,014	195,198	3,411
Chinook or king					16,393	254	49,487	1,604
Chum or keta					86,175	611	102,021	737
Humpback or pink					144,943	1,695	145,012	1,696
Silver or coho					16,732	192	36,908	712

[9] Less than 500 pounds or dollars.

Fisheries of the United States and Alaska, 1932—Continued

CATCH: BY SECTIONS—Continued

[Expressed in thousands of pounds and thousands of dollars; that is, 000 omitted]

Species	Lakes		Mississippi River and tributaries		Alaska		Total	
	Quantity	*Value*	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
FISH—continued								
Sauger	3,448	135	2	1			3,450	136
Sculpin							90	6
Scup							13,976	255
Sea bass							9,097	267
Sea bass, white (California)							807	61
Sea robin							148	1
Shad							11,161	941
Sharks							5,317	14
Sheepshead:								
Fresh-water	2,158	44	3,905	143			6,063	187
Salt-water							763	16
Silver perch							21	(9)
Silversides							173	9
Skates							1,321	13
Smelts	98	3			7	(9)	3,211	117
Snapper:								
Mangrove							96	2
Red							6,365	315
Snook							323	8
Spanish mackerel							6,547	222
Splittail							24	1
Spot							2,656	47
Squawfish							2	(9)
Squeteagues or "sea trout":								
Gray							26,992	633
Spotted							6,330	304
Steelhead trout	5	1			3	(9)	2,467	62
Striped bass							2,185	245
Sturgeon	30	6					175	18
Sturgeon, shovelnose			87	8			87	8
Suckers	6,192	137	315	13			6,774	163
Sunfish	8	(9)	22	1			750	19
Surffishes							253	10
Swellfish							(9)	(9)
Swordfish							5,281	551
Tautog							607	24
Tenpounder							80	1
Thimble-eyed mackerel							80	1
Tilefish							2,119	60
Tomcod							84	2
Tripletail							2	(9)
Tullibee	1,297	16					1,297	16
Tuna and tunalike fishes:								
Albacore							620	31
Bluefin or horse mackerel							1,389	66
Bonito							2,862	53
Skipjack or striped							21,637	751
Yellowfin							36,923	1,505
Turbot							4	(9)
White bass	253	10	3	(9)			256	10
Whitebait							141	7
Whitefish	9,730	1,045					9,892	1,053
Whitefish, Menominee	233	17					233	17
White perch							1,781	67
Whiting							9,906	92
Wolffish							1,958	29
Yellow perch	11,472	467					11,868	485
Yellow pike	4,441	458	5	1			4,446	459
Yellowtail							1,888	55
Miscellaneous fish							166	4
Total	81,829	4,304	44,062	2,258	595,943	6,813	2,269,178	38,176
SHELLFISH, ETC.								
Abalone							563	77
Clams:								
Cockle							275	25
Coquina							5	(9)
Hard					2	(9)	9,037	1,210
Pismo							27	7
Razor					1,755	89	2,718	221
Soft							11,402	548
Surf							544	28
Mixed							15	2

9 Less than 500 pounds or dollars.

Fisheries of the United States and Alaska, 1932—Continued

CATCH: BY SECTIONS

[Expressed in thousands of pounds and thousands of dollars; that is, 000 omitted]

Species	Lakes		Mississippi River and tributaries		Alaska		Total	
SHELLFISH, ETC.—continued	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
Conchs							40	3
Crabs:								
Hard					609	46	72,210	1,095
King							3,501	7
Soft							5,588	891
Stone							154	8
Crawfish	20	1	29	(9)			129	7
Lobsters:								
Common							11,157	2,079
Spiny							1,464	174
Mussels, sea							176	12
Mussel shells	1,895	26	37,254	422			39,149	448
Octopus							60	3
Oysters:								
Eastern, market, public							29,897	1,743
Eastern, market, private							36,199	8,965
Western, market							270	139
Japanese, market							2,103	129
Periwinkles							78	3
Scallops:								
Bay							2,749	540
Sea							3,344	334
Shrimp			49	4	547	23	91,704	2,134
Squid							9,871	112
Terrapin			19	(9)			46	5
Turtles			94	3			168	8
Frogs			875	131			876	181
Irish moss							84	4
Sponges							613	697
Bloodworms							91	77
Sandworms							54	39
Pearls and slugs		1		80				81
Total	1,915	28	38,320	640	2,913	158	336,361	16,481
WHALE PRODUCTS [10]								
Meal					2,090	14	2,524	24
Oil:								
Sperm					54	1	54	1
Whale					5,520	76	6,023	82
Total					7,664	91	8,601	107
Grand total	83,744	4,332	82,382	2,898	606,520	7,062	2,614,140	54,764

[9] Less than 500 pounds or dollars.
[10] The weight of whales caught was not determined; therefore, the weight of the manufactured products is shown.

NOTE.—The above excludes the seed-oyster fishery. See separate section following.

CATCH: BY STATES

[Expressed in thousands of pounds and thousands of dollars; that is, 000 omitted]

State	Marine and coastal rivers		Mississippi River and tributaries		Lakes [11]		Total	
	Quantity	*Value*	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
Alabama	6,107	169	1,822	33			7,929	202
Arkansas			15,733	412			15,733	412
California	442,883	5,377					442,883	5,377
Connecticut	21,046	1,111					21,046	1,111
Delaware	3,729	101					3,729	101
Florida	101,920	2,917			1,370	56	103,290	2,973
Georgia	16,523	186					16,523	186
Illinois			14,262	367	885	58	15,147	425
Indiana			7,718	157	630	37	8,348	194

[11] Includes Lake Ontario, Lake Erie, Lake Huron, Lake Michigan, Lake Superior, Rainy Lake, Namakan Lake, Lake of the Woods, Lake Okeechobee, and several mussel-bearing streams tributary to Lakes Huron, Erie, and Michigan.

Fisheries of the United States and Alaska, 1922—Continued

CATCH BY STATES—Continued

[Expressed in thousands of pounds and thousands of dollars; that is, 000 omitted]

State	Marine and coastal rivers		Mississippi River and tributaries		Lakes		Total	
	Quantity	*Value*	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
Iowa			7,778	303			7,778	303
Kansas			455	17			455	17
Kentucky			1,622	61			1,622	61
Louisiana	48,340	1,181	19,213	994			67,553	2,175
Maine	90,602	2,413					90,602	2,413
Maryland	61,626	1,940					61,626	1,940
Massachusetts	347,593	8,928					347,593	8,928
Michigan					30,130	2,162	30,130	2,162
Minnesota			3,498	138	8,507	199	12,005	337
Mississippi	20,603	497	2,650	123			23,253	620
Missouri			928	77			928	77
Nebraska			145	16			145	16
New Hampshire	744	58					744	58
New Jersey	72,595	2,218					72,595	2,218
New York	64,866	2,333			1,435	112	66,301	2,445
North Carolina	86,214	827					86,214	827
Ohio			185	7	28,515	1,161	28,700	1,168
Oklahoma			40	4			40	4
Oregon	22,986	729					22,986	729
Pennsylvania	31	2			2,535	110	2,566	112
Rhode Island	20,536	1,491					20,536	1,491
South Carolina	4,536	123					4,536	123
South Dakota			114	11			114	11
Tennessee			3,435	104			3,435	104
Texas	14,304	472	139	6			14,443	478
Virginia	297,381	3,965					297,381	3,965
Washington	94,959	3,378					94,959	3,378
Wisconsin			2,645	68	11,107	493	13,752	561
Alaska	606,520	7,062					606,520	7,062
Total	2,446,644	47,478	82,382	2,898	85,114	4,388	2,614,140	54,764

SEED OYSTER FISHERY

Item	New England		Middle Atlantic	
OPERATING UNITS				
Fishermen:	*Number*		*Number*	
On vessels	79		1,742	
On boats and shore:				
Regular	16		390	
Casual	172		190	
Total	267		2,322	
Vessels:				
Steam	4			
Net tonnage	344			
Motor	13		19	
Net tonnage	140		226	
Sail	3		152	
Net tonnage	23		3,036	
Total vessels	20		171	
Total net tonnage	507		3,262	
Boats:				
Motor	6		273	
Other	112		176	
Apparatus:				
Dredges, oyster	97		334	
Yards at mouth	88		397	
Tongs	129		537	
Rakes	51		50	
CATCH	*Bushels*	*Value*	*Bushels*	*Value*
Oysters:				
Seed, public, spring	29,164	$15,840	1,250,691	$425,554
Seed, public, fall	43,472	19,900	35,021	10,661
Seed, private, spring	136,356	74,445	21,113	19,833
Seed, private, fall	20,200	9,600	24,965	24,965
Total	229,192	119,785	1,331,790	481,013

Fisheries of the United States and Alaska, 1932—Continued

SEED OYSTER FISHERY—Continued

Item	Chesapeake		South Atlantic and Gulf		Total	
OPERATING UNITS	*Number*		*Number*		*Number*	
Fishermen:						
On vessels					1,821	
On boats and shore:						
Regular	1,300		12		1,718	
Casual	447				809	
Total	1,747		12		4,348	
Vessels:						
Steam					4	
Net tonnage					344	
Motor					32	
Net tonnage					366	
Sail					155	
Net tonnage					3,059	
Total vessels					191	
Total net tonnage					3,769	
Boats:						
Motor	746		6		1,031	
Other	184				472	
Apparatus:						
Dredges, oyster			12		443	
Yards at mouth			12		497	
Tongs	1,391				2,057	
Rakes	86				187	
CATCH	*Bushels*	*Value*	*Bushels*	*Value*	*Bushels*	*Value*
Oysters:						
Seed, public, spring	565,005	$68,575	39,741	$8,280	1,884,601	$518,249
Seed, public, fall	597,048	89,025			975,541	119,586
Seed, private, spring	13,000	1,040			170,469	95,318
Seed, private, fall					45,165	34,565
Total	1,475,053	158,640	39,741	8,280	3,075,776	767,718

NOTE.—Of the number of persons fishing for seed oysters, 159 in the New England States, 1,537 in the Middle Atlantic States, 1,609 in the Chesapeake States and all in the South Atlantic and Gulf States—a total of 3,317 are duplicated among those fishing for market oysters or other species. Similarly the following craft and gear are duplicated: 100 boats other than motor, 112 tongs and all the rakes in the New England States; 93 vessels, 262 motor boats, 165 other boats, 176 dredges, 527 tongs and 47 rakes in the Middle Atlantic States; 692 motor boats, 172 other boats, 1,291 tongs and all the rakes in the Chesapeake States; and all craft and gear in the South Atlantic and Gulf States—a total of 93 vessels, 960 motor boats, 487 other boats, 188 dredges, 1,930 tongs, and 184 rakes.

Yield of the fisheries of the United States, 1932: By gear[1]

Gear	New England		Middle Atlantic		Chesapeake	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Purse seines	62,858,926	$700,711	45,176,110	$112,226	194,046,490	$651,400
Haul seines	787,520	30,597	2,674,156	75,346	3,257,274	127,939
Gill nets	19,028,727	419,993	2,723,403	129,382	2,317,619	177,664
Lines	97,374,488	2,176,389	11,177,435	303,007	45,642,755	457,240
Pound nets	15,837,690	226,453	27,753,844	554,907	61,672,014	1,405,072
Floating traps	9,777,795	179,897	232,062	5,379		
Weirs	19,113,722	79,862	1,437,000	2,926		
Stop nets			143,587	14,565	27,343	1,299
Fyke nets	210,834	9,721	1,428,320	33,331	783,253	34,618
Dip nets	4,634,504	46,683	58,321	7,670	6,109,662	282,439
Cast nets			2,100	228		
Scap nets			151,198	8,221		
Bag nets	81,283	7,604				
Drag nets			116,000	19,142		
Push nets	66,528	16,587				
Pocket nets	1,000	120				
Otter trawls	209,054,097	4,729,013	23,120,463	653,201	5,057,405	142,241
Traps	101,200	1,276				

[1] All figures are for 1932 except those for the Mississippi River and tributaries, which are for 1931.

Yield of the fisheries of the United States, 1932: By gear—Continued

Gear	New England		Middle Atlantic		Chesapeake	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Pots	11,964,238	$2,009,039	2,813,094	$239,796	284,333	$18,059
Harpoons	4,629,021	488,335	69,906	8,291		
Spears	210,111	15,093	163,899	20,557		
Scrapes, crab					1,506,357	52,758
Dredges	11,110,609	1,814,861	17,965,769	1,957,372	15,696,536	671,414
Tongs	1,550,221	232,692	1,847,512	280,136	21,145,406	1,687,776
Rakes	1,185,515	143,986	857,472	112,490	1,019,244	112,278
Forks	2,773,693	268,506	476,376	76,859		
Hoes	8,057,960	306,653	668,240	25,965		
Grabs			100	5		
Picks					236,960	63,165
By hand	111,199	7,225	164,778	12,883	204,834	19,627
Total	480,520,881	14,001,296	141,221,145	4,653,975	359,007,494	5,904,989

Gear	South Atlantic and Gulf		Pacific		Lakes	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Purse seines	89,971,248	$163,404	238,093,610	$1,476,067		
Haul seines	24,175,742	602,678	3,759,436	124,211	4,538,616	$129,882
Gill nets	38,137,303	943,195	30,220,589	936,156	32,046,421	1,709,171
Trammel nets	3,159,789	118,055	668,367	46,512	205,545	4,140
Lines	25,218,356	764,227	119,795,559	4,264,625	2,307,481	206,357
Pound nets	10,763,098	190,839	13,993,604	549,142	9,207,975	466,941
Weirs	2,000	20	723,190	10,848		
Wheels	263,000	1,505	529,022	20,348		
Stop nets	891,793	15,055				
Fyke nets	345,520	10,661	278,053	28,538	3,425,469	161,008
Dip nets	491,388	27,215	1,480,485	35,929		
Cast nets	108,932	3,994				
Bag nets			1,300,416	19,506		
Drag nets			141,138	4,507		
Reef nets			22,846	883		
Lampara nets			124,030,670	460,664		
Paranzella nets			12,105,633	414,329		
Otter trawls	87,089,274	2,016,418	79,365	1,750		
Beam trawls			1,770,993	34,581		
Traps			6,126,457	454,925	30,098,291	1,626,039
Pots	1,117,738	50,446			19,677	984
Harpoons			1,624,719	75,672		
Spears	155,803	9,036				
Dredges	7,373,518	297,347				
Tongs	6,049,736	368,583	[3] 3,520,850	[3] 447,735		
Crowfoot bars					1,468,430	21,071
Rakes	312,476	20,913				
Forks	[4] 281,840	[4] 11,356				
Grabs	2,693,154	56,533				
Picks					246,966	3,647
Hooks	335,203	234,967				
Diving apparatus, abalone, or sponge	278,824	462,077	563,469	77,386		
By hand	701,493	59,861			179,518	2,536
Total	299,916,728	6,428,385	560,828,471	9,484,314	83,744,389	4,331,776

Gear	Mississippi River and tributaries		Total	
	Pounds	*Value*	*Pounds*	*Value*
Purse seines			630,146,393	$3,193,808
Haul seines	13,739,657	$574,541	52,932,401	1,665,194
Gill nets	166,598	6,547	124,640,660	4,322,108
Trammel nets	1,134,206	75,615	5,167,907	244,822
Lines	10,140,037	772,245	311,656,111	8,944,180
Pound nets	224,275	9,541	139,452,500	3,402,895
Floating traps			10,009,857	185,276
Weirs			21,275,912	93,656
Wheels			792,022	21,853
Stop nets			1,062,723	80,919
Fyke nets	18,507,204	797,130	24,978,653	1,075,007
Dip nets	30,045	3,307	12,804,405	403,243
Cast nets			111,032	4,222
Scap nets			151,198	8,221
Bag nets			1,381,699	27,110

[3] Includes shovels, rakes, and dredges.
[4] Includes coquina scoops.

Yield of the fisheries of the United States, 1932: By gear—Continued

Gear	Mississippi River and tributaries		Total	
	Pounds	*Value*	*Pounds*	*Value*
Drag nets			257, 138	$23, 649
Push nets			66, 528	16, 587
Pocket nets			1, 000	120
Reef nets			22, 846	883
Lampara nets			124, 030, 670	460, 664
Paranzella nets			12, 105, 633	414, 329
Otter trawls			824, 400, 604	7, 542, 623
Beam trawls			1, 770, 993	34, 581
Traps	77, 751	$4, 215	36, 403, 699	2, 086, 455
Pots	[1] 232, 704	[1] 22, 062	16, 431, 784	2, 840, 386
Harpoons			6, 823, 646	572, 298
Spears	2, 250	270	532, 063	44, 956
Scrapes, crab			1, 506, 357	52, 758
Dredges	3, 699, 100	40, 958	55, 845, 532	4, 781, 952
Tongs	1, 601, 876	21, 091	35, 715, 601	3, 038, 018
Crowfoot bars	20, 893, 550	265, 443	22, 361, 980	286, 514
Rakes	370, 130	4, 029	3, 744, 837	393, 696
Forks	4, 812, 737	76, 214	8, 344, 146	432, 935
Hoes			8, 726, 200	832, 618
Grabs	873, 099	130, 621	3, 566, 353	187, 159
Picks			483, 926	66, 812
Hooks			335, 203	234, 967
Diving apparatus, abalone, or sponge			842, 293	539, 463
By hand	5, 877, 304	93, 528	7, 239, 126	195, 660
Total	82, 382, 523	2, 897, 357	2, 007, 621, 631	47, 702, 092

[1] Includes baskets.

CANNED FISHERY PRODUCTS AND BYPRODUCTS TRADE

The output of canned fishery products and byproducts in the United States and Alaska in 1932 was valued at $56,215,577. Of the total, canned products comprised $43,749,182, and byproducts, $12,466,395, a decrease of 31 percent in the value of canned products and 25 percent in the value of byproducts when compared with the respective values of the same groups for the previous year.

Fishery products were canned at 343 establishments in the United States and Alaska during 1932. The combined output of these canneries amounted to 10,494,606 standard cases. The net weight of the products canned amounted to 416,062,406 pounds.

Canned fishery products or byproducts were prepared in 27 States and Alaska during 1932. Alaska ranked first in the value of these products, accounting for 41 percent of the total; and California ranked second with 19 percent.

Canned fishery products and byproducts of the United States and Alaska, 1932

SUMMARY OF PRODUCTION: BY COMMODITIES

Product	Number of plants	Standard cases	Pounds	Value
Canned products:				
Salmon—				
United States	35	654, 460	31, 414, 080	$4, 744, 162
Alaska	87	5, 254, 509	252, 216, 432	21, 715, 918
Sardines—				
Maine	13	545, 697	13, 642, 425	1, 370, 050
California	19	953, 981	45, 791, 088	2, 358, 399
Tuna and tunalike fishes	15	1, 206, 177	28, 948, 248	6, 183, 019
Alewives	8	11, 820	567, 360	24, 950
Alewife roe	24	21, 592	1, 036, 416	77, 716
Shad roe	11	1, 945	93, 360	51, 915

Canned fishery products and byproducts of the United States and Alaska, 1932—Continued

SUMMARY OF PRODUCTION: BY COMMODITIES—Continued

Product	Number of plants	Standard cases	Pounds	Value
Canned products—Continued.				
Mackerel	10	94, 723	4, 546, 704	$253, 572
Fish flakes	5	12, 552	602, 496	104, 575
Fish cakes, balls, etc	6	64, 556	3, 098, 688	463, 107
Cat and dog food	6	117, 255	5, 628, 240	286, 455
Salmon roe and cavier	5	4, 288	205, 824	28, 166
Sturgeon caviar	6	2, 541	121, 968	330, 149
Whitefish roe and caviar	5	896	43, 008	34, 047
Salmon eggs (for bait)	8	4, 204	201, 792	95, 415
Miscellaneous fish, roe, and caviar	16	10, 105	485, 040	60, 054
Oysters	40	392, 664	5, 889, 960	1, 007, 624
Shrimp	51	758, 106	12, 612, 551	2, 594, 980
Clam products	63	371, 288	[1] 8, 376, 870	1, 797, 002
Crabs	7	5, 039	241, 872	80, 581
Turtle products	3	3, 663	175, 824	62, 879
Miscellaneous shellfish	6	2, 545	122, 160	24, 447
Total	[2] 343	10, 494, 606	416, 062, 406	43, 749, 182

Product	Quantity	Value
By-products:		
Oyster shell products .... tons	307, 652	$1, 464, 961
Fresh-water mussel shell products		3, 556, 260
Marine pearl-shell products		2, 864, 019
Scrap, meal, etc .... tons	101, 738	2, 406, 506
Marine animal oils .... gallons	12, 195, 325	1, 392, 255
Miscellaneous by-products		782, 394
Total		12, 466, 395
Grand total		56, 215, 577

VALUE OF PRODUCTION: BY STATES

State	Canned products	Byproducts[3]	Total
Maine	$1, 825, 323	$99, 876	$1, 925, 199
Massachusetts	808, 817	1, 063, 828	1, 957, 405
Rhode Island		24, 760	
Connecticut		787, 701	787, 701
New York	686, 526	1, 173, 466	2, 690, 496
New Jersey		830, 504	
Pennsylvania		700, 128	700, 128
Delaware		6, 589	6, 586
Maryland	51, 828	561, 401	613, 229
Virginia	52, 015	918, 281	970, 296
North Carolina	265, 651	164, 647	489, 059
South Carolina		58, 761	
Georgia	311, 234	468, 417	972, 786
Florida	193, 135		
Alabama	240, 316	160, 007	1, 522, 305
Mississippi	1, 121, 982		
Louisiana	1, 316, 227	367, 817	1, 684, 044
Texas, Utah, and Wisconsin	264, 748	87, 294	352, 042
Missouri, Illinois, and Kentucky		67, 397	67, 397
Iowa		2, 499, 281	2, 499, 281
Washington	3, 109, 835	57, 534	5, 318, 878
Oregon	2, 151, 509		
California	9, 052, 330	1, 774, 218	10, 826, 548
Alaska	22, 237, 706	594, 488	22, 832, 194
Total	43, 749, 182	12, 466, 395	56, 215, 577

[1] "Cutout" or "drained" weights of can contents are included for whole and minced clams, and gross can contents for chowder, bouillon, broth, juice, and cocktail.
[2] Exclusive of duplication.
[3] Includes menhaden, fresh-water mussel-shell products, and marine pearl-shell products.

Pack of canned salmon—Standard cases

Product	Alaska							
	Southeast		Central		Western		Total	
	Cases	*Value*	*Cases*	*Value*	*Cases*	*Value*	*Cases*	*Value*
Chinook or king:								
1-pound tall	18,424	$81,800	14,436	$62,029	10,153	$43,931	43,013	$187,760
1-pound flat	4,691	27,423	8,121	61,060	1,988	13,062	14,800	101,545
½-pound flat	509	4,684	9,745	73,647	1,459	11,672	11,713	90,003
Total	23,624	113,907	32,302	196,736	13,600	68,665	69,526	379,308
Blueback, red or sockeye:								
1-pound tall	111,243	593,185	572,260	3,039,034	1,296,347	7,286,064	1,979,850	10,918,288
1-pound flat	13,421	91,263	54,495	353,140	7,608	47,943	75,524	492,346
½-pound flat	14,278	110,802	33,406	278,254	23	184	47,707	389,240
Total	138,942	795,250	660,161	3,670,428	1,303,978	7,334,191	2,103,081	11,799,869
Silver or coho:								
1-pound tall	81,852	334,789	60,655	244,066	463	1,882	142,970	580,737
1-pound flat	1,763	8,815					1,763	8,815
½-pound flat	3,423	21,540	19	123			3,442	21,663
Total	87,038	365,144	60,674	244,189	463	1,882	148,175	611,215
Humpback or pink:								
1-pound tall	1,372,259	4,331,866	723,632	2,238,803	10,088	32,628	2,105,979	6,603,297
½-pound flat	6,747	31,787	419	1,878			7,166	33,665
Total	1,379,006	4,363,653	724,051	2,240,681	10,088	32,628	2,113,145	6,636,962
Chum or keta:								
1-pound tall	578,819	1,609,799	147,410	408,523	93,703	267,629	819,932	2,285,951
½-pound flat	624	2,496					624	2,496
Total	579,443	1,612,295	147,410	408,523	93,703	267,629	820,556	2,288,447
Steelhead:								
1-pound tall	26	117					26	117
Grand total	2,208,079	7,250,866	1,624,598	6,760,557	1,421,832	7,704,995	5,254,509	21,715,918

Product	United States						Grand total, Alaska and United States	
	Washington		Oregon and California		Total			
	Cases	*Value*	*Cases*	*Value*	*Cases*	*Value*	*Cases*	*Value*
Chinook or king:								
1-pound tall	9,554	$43,767	29,795	$102,242	39,349	$146,009	82,362	$333,769
1-pound oval	241	5,061	928	19,280	1,169	24,341	1,169	24,341
1-pound flat	18,098	111,435	31,235	216,518	49,333	327,953	64,133	429,498
½-pound oval	13	286	244	5,368	257	5,654	257	5,654
½-pound flat	49,955	531,628	99,527	1,036,755	149,482	1,568,383	161,195	1,658,386
¼-pound flat	79	1,240	11,164	137,478	11,243	138,718	11,243	138,718
Total	77,940	693,417	172,893	1,517,641	250,833	2,211,058	320,359	2,590,366
Blueback, red or sockeye:								
1-pound tall	38	304			38	304	1,979,888	10,918,587
1-pound flat	21,426	210,659			21,426	210,659	96,950	703,005
½-pound flat	70,226	842,106	1,859	19,334	72,085	861,440	119,792	1,250,680
¼-pound flat	387	5,573			387	5,573	387	5,573
Total	92,077	1,058,642	1,859	19,334	93,936	1,077,976	2,197,017	12,877,845
Silver or coho:								
1-pound tall	19,692	78,658	2,752	121,088	22,444	199,746	165,414	780,483
1-pound flat	28,618	144,167	13,145	78,870	41,763	223,037	43,526	231,852
½-pound oval	18	126			18	126	18	126
½-pound flat	12,852	83,630	5,989	49,110	18,841	132,740	22,283	154,403
¼-pound oval	458	8,061			458	8,061	458	8,061
¼-pound flat	4,657	46,124	16,982	175,677	21,639	221,801	21,639	221,801
Total	66,295	360,766	38,868	424,745	105,163	785,511	253,838	1,396,726
Humpback or pink:								
1-pound tall	1,261	4,287			1,261	4,287	2,107,240	6,607,584
1-pound flat	96	326			96	826	96	326
½-pound flat	320	1,408			320	1,408	7,486	35,073
Total	1,677	6,021			1,677	6,021	2,114,822	6,642,983

Pack of canned salmon—Standard cases—Continued

Product	United States						Grand total, Alaska and United States	
	Washington		Oregon and California		Total			
	Cases	*Value*	*Cases*	*Value*	*Cases*	*Value*	*Cases*	*Value*
Chum or keta:								
1-pound tall	167,571	$469,199	16,305	$42,393	183,876	$511,592	1,003,808	$2,797,543
1-pound flat	13	39	22	62	35	101	35	101
½-pound flat	1,167	3,968	1,377	4,957	2,544	8,925	3,168	11,421
Total	168,751	473,206	17,704	47,412	186,455	520,618	1,007,011	2,809,065
Steelhead:								
1-pound tall	6	24	1,023	4,706	1,029	4,730	1,055	4,847
1-pound oval			30	270	30	270	30	270
1-pound flat	3,829	22,974	1,819	10,914	5,648	33,888	5,648	33,888
½-pound oval			945	13,230	945	13,230	945	13,230
½-pound flat	1,656	17,161	2,521	20,168	4,177	37,329	4,177	37,329
¼-pound oval			496	7,936	496	7,936	496	7,936
¼-pound flat			4,071	45,595	4,071	45,595	4,071	45,595
Total	5,491	40,159	10,905	102,819	16,396	142,978	16,422	143,095
Grand total	412,231	2,632,211	242,229	2,111,951	654,460	4,744,162	5,908,969	26,460,080

NOTE.—"Standard cases" represent the various sized cases converted to the equivalent of 48 1-pound cans to the case. Salmon were canned at 24 plants in Washington, 9 in Oregon, 2 in California, and 87 in Alaska.

Pack of canned sardines

Sardines (herring)	Maine	
	Cases	*Value*
Quarters, ¼-pound (100 cans):		
In cottonseed oil	450,357	$1,130,261
In other sauces or oils	42,970	120,119
Three-quarters, ¾-pound (48 cans):		
In mustard	36,368	119,670
Total	529,695	1,370,050
Total (standard cases)	545,697	

Sardines (pilchard)	California	
	Cases	*Value*
1-pound oval (48 cans):		
In tomato sauce	757,293	$1,794,436
In mustard	81,431	193,154
In other sauces or oils	12,029	28,174
¼-pound square (100 cans):		
In various sauces or oils	7,681	67,429
6-ounce (100 cans):		
In various sauces or oils	62,040	150,594
1-pound tall (48 cans):		
In natural oil	45,087	98,214
Other sizes:		
In various sauces or oils (standard cases)	5,674	26,398
Total	971,235	2,358,399
Total (standard cases)	953,981	

NOTE.—"Standard cases" represent the various sized cases converted to the uniform basis of 100 ¼-pound cans to case of sardines (herring), and 48 1-pound cans to the case of sardines (pilchard). Sardines were canned at 13 plants in Maine and 19 in California.

Pack of canned tuna and tunalike fishes in California

Size	Albacore		Yellowfin		Bluefin		Striped	
	Cases	*Value*	*Cases*	*Value*	*Cases*	*Value*	*Cases*	*Value*
¼-pound (48 cans)	1,673	$6,132	[1] 79,402	[1] $292,911	739	$2,240	20,269	$67,441
¼-pound (100 cans)			364	2,184			2,169	18,014
½-pound (48 cans)	48,856	263,887	465,312	2,525,319	5,563	28,143	205,945	970,700
1-pound (48 cans)	[2] 8,185	[2] 81,557	[2] 43,121	[2] 397,772	767	6,762	18,968	111,915
Flakes (standard cases)	7,221	30,348	[3] 93,763	[3] 366,327	2,114	8,592	15,945	60,776
Total	65,935	381,924	681,962	3,584,518	9,183	45,737	258,296	1,223,846
Total (standard cases)	73,284		685,397		9,581		262,220	

[1] Includes the pack in ⅛-pound jars, 96 to the case, which have been converted to the equivalent of ¼-pound cans, 48 to the case.
[2] Includes the pack in 4-pound cans, 12 to the case, which have been converted to the equivalent of 1-pound cans, 48 to the case.
[3] Includes a small amount of mixed bluefin and yellowfin flakes.

Pack of canned tuna and tunalike fishes in California—Continued

Size	"Tonno"		Bonito		Yellowtail		Total	
	Cases	*Value*	*Cases*	*Value*	*Cases*	*Value*	*Cases*	*Value*
¼-pound (48 cans)	99	$333	1,001	$2,854			103,183	$371,911
⅓-pound (100 cans)	108,669	673,909	7,994	48,631			119,196	737,738
½-pound (48 cans)	8,754	50,564	25,034	101,642	2,023	$8,142	761,487	3,948,397
1-pound (48 cans)			7,812	53,079	1,092	7,824	74,945	658,909
Flakes (standard cases)			10	21			119,053	466,064
Total	117,522	724,806	41,851	206,227	3,115	15,966	1,177,864	6,188,019
Total (standard cases)	121,993		49,495		4,207		1,206,177	

NOTE.—"Standard cases" represent the various sized cases converted to the equivalent of 48 ½-pound cans to the case. Tuna and tunalike fishes were canned in 15 plants in California.

Pack of canned alewives and alewife roe

STANDARD CASES

Product	Maryland		Virginia		North Carolina		Total	
	Cases	*Value*	*Cases*	*Value*	*Cases*	*Value*	*Cases*	*Value*
Alewives	11,820	$24,950					11,820	$24,950
Alewife roe	6,169	25,028	14,619	$48,965	804	$3,723	21,592	77,716
Total	17,989	49,978	14,619	48,965	804	3,723	33,412	102,666

ACTUAL CASES

Product and size	Cases	Value
Alewives:		
16-ounce (48 cans)	11,820	$24,950
Alewife roe:		
7½-, 8½-, and 11-ounce (48 cans)	3,610	7,847
10-ounce (48 cans)	2,060	5,368
10-, 15-, and 18-ounce (24 cans)	750	1,795
16-ounce (48 cans)	6,219	26,114
17-ounce (24 cans)	22,131	36,592
Total		77,716
Grand total		102,666

NOTE.—"Standard cases" represent the various sized cases converted to the equivalent of 48 1-pound cans to the case. Alewives or alewife roe were canned at 5 plants in Maryland, 17 in Virginia, and 2 in North Carolina.

Pack of canned shrimp

STANDARD CASES

State	Dry pack (in tins)		Wet pack (in tins)		Wet pack (in glass)[1]		Total	
	Cases	*Value*	*Cases*	*Value*	*Cases*	*Value*	*Cases*	*Value*
South Carolina and Alabama	17,668	$62,697	45,518	$156,575			63,186	$219,272
Georgia	18,748	67,645	53,357	173,619	8,143	$47,123	80,248	288,387
Florida	2,237	7,272	8,805	28,226	2,597	16,480	13,639	51,978
Mississippi	33,431	118,912	126,474	430,071			159,905	548,983
Louisiana	104,230	362,697	270,483	890,413			374,713	1,253,110
Texas	14,836	50,625	46,901	159,853			61,737	210,478
Louisiana and Texas					4,678	27,772	4,678	27,772
Total	191,150	664,848	551,538	1,838,757	15,418	91,375	758,106	2,594,980

[1] The pack of shrimp in glass for Louisiana and Texas has been grouped to avoid the disclosure of private enterprise.

Pack of canned shrimp—Continued

ACTUAL CASES

Size	Cases	Value
In tins, dry:		
5-ounce (48 cans)[1]	172,885	$587,626
8¼-ounce (24 cans)	20,659	72,552
8½-ounce (24 cans)	1,436	4,670
In tins, wet:		
5¾-ounce (48 cans)[2]	548,278	1,825,976
9¾-ounce (24 cans)	3,845	12,781
In glass, wet:		
4- and 5¼-ounce (24 jars)	4,712	13,804
5¾-ounce (24 jars)	17,589	50,289
6-ounce (24 jars)	8,837	27,282
Total		2,594,980

[1] Includes a small production packed in 4- and 4½-ounce cans, 48 to the case, which has been converted to the equivalent of 5-ounce cans, 48 to the case.
[2] Includes a small production packed in 4-ounce cans, 48 to the case, which has been converted to the equivalent of 5¾-ounce cans, 48 to the case.

NOTE.—"Standard cases" represent the various sized cases converted to the equivalent of 48 5-ounce cans to the case in the dry pack and 48 5¾-ounce cans to the case in the wet pack. Shrimp were canned at 1 plant in South Carolina, 6 in Georgia, 5 in Florida, 2 in Alabama, 15 in Mississippi, 17 in Louisiana, and 5 in Texas.

Pack of canned oysters

STANDARD CASES

State	Cases	Value	State	Cases	Value
South Carolina	80,423	$202,557	Louisiana	19,083	59,405
Georgia and Florida	14,151	35,725	Washington	9,140	53,683
Alabama	33,416	80,415	Total	392,664	1,007,624
Mississippi	236,451	575,839			

ACTUAL CASES

Size	Cases	Value	Size	Cases	Value
4-ounce (48 cans)	33,842	$73,473	8-ounce (24 cans)	10,542	$22,477
5-ounce (48 cans)	305,287	760,274	10-ounce (24 cans)	42,887	103,624
6-ounce (48 cans)	721	2,315	Total		1,007,624
7½-ounce (48 cans)	5,412	45,461			

NOTE.—"Standard cases" represent the various sized cases converted to the equivalent of 48 5-ounce cans to the case. Oysters were canned at 6 plants in South Carolina, 2 in Georgia, 3 in Florida, 3 in Alabama, 15 in Mississippi, 5 in Louisiana, and 6 in Washington. The pack during the spring period (January to May 1932) amounted to 336,941 standard cases, valued at $855,425, and that during the fall period (September to December 1932) amounted to 55,723 standard cases, valued at $152,199. The pack during the spring period of 1931 amounted to 244,284 standard cases, valued at $787,719, and during the fall period of 1931, 61,994 standard cases, valued at $175,806.

Pack of canned clams and clam products

Item and State	Cases	Value
Razor clams (Washington, Oregon, and Alaska):		
Whole—		
No. 1, 5-ounce (48 cans)	3,716	$34,581
Other sizes (standard cases)	1,962	14,075
Minced—		
½-pound, 4-ounce (48 cans)	91,155	577,134
No. 1, 5-ounce (48 cans)	10,518	88,332
No. 2, 10-ounce (24 cans)	178	1,477
Other sizes (standard cases)	447	2,940
Juice—		
All sizes (standard cases)	537	1,886
Total	108,513	720,425
Total (standard cases)	90,282	

Pack of canned clams and clam products—Continued

Item and State	Cases	Value
Hard clams (Massachusetts, Rhode Island, New York, New Jersey, Florida, Washington, and Alaska):[1]		
Whole—		
1-pound, 8-ounce (48 cans)	1,032	$6,846
No. 2, 10-ounce (24 cans)	2,832	17,654
No. 10, 52-ounce (6 cans)	1,817	8,368
Other sizes (standard cases)	2,145	16,590
Minced—		
½-pound, 4-ounce (48 cans)	4,091	15,703
No. 1, 5-ounce (48 cans)	986	5,380
Other sizes (standard cases)	5,456	35,859
Chowder—		
No. 1, 10-ounce (48 cans)	79,209	285,568
33-ounce (12 cans)	12,457	89,625
No. 10, 102-ounce (6 cans)	1,957	12,017
Other sizes (standard cases)	24,219	121,331
Juice—		
No. 1, 10-ounce (48 cans)	906	5,878
No. 10, 102-ounce (6 cans)	1,791	6,663
Other sizes (standard cases)	2,120	9,208
Cocktail—		
4-ounce (48 jars)	535	2,300
Other sizes (standard cases)	407	3,891
Broth and bouillon—		
All sizes (standard cases)	4,279	25,002
Total	146,239	667,883
Total (standard cases)	155,391	
Soft clams (Maine and Massachusetts):		
Whole—		
No. 1, 5-ounce (48 cans)	56,791	209,786
1-pound, 8-ounce (48 cans)	3,040	13,830
No. 2, 10-ounce (24 cans)	10,486	30,522
Other sizes	3,529	15,093
Chowder—		
No. 1, 10-ounce (48 cans)	13,331	45,653
33-ounce (24 cans)	12,225	37,286
Other sizes (standard cases)	7,932	37,918
Bouillon and juice—		
No. 2, 20-ounce (24 cans)	3,117	5,900
Other sizes (standard cases)	5,394	12,706
Total	115,845	408,694
Total (standard cases)	125,615	
Grand total (standard cases)	371,288	1,797,002

[1] Includes a small amount of coquina broth packed in Florida.

NOTE.—"Standard cases" represent the various sized cases converted to the equivalent of 48 no. 1, 5-ounce cans to the case, for whole and minced clams; and 48 no. 1, 10-ounce cans to the case, for other clam products. Razor clam products were canned at 12 plants in Washington, 4 in Oregon, and 15 in Alaska; hard clam products at 1 plant in Massachusetts, 1 in Rhode Island, 3 in New York, 1 in New Jersey, 1 in Florida, 6 in Washington, and 1 in Alaska; soft clam products, at 17 plants in Maine and 1 in Massachusetts; and coquina clam products, at 2 plants in Florida.

Pack of miscellaneous canned fishery products

Item	Standard cases	Value	Item	Standard cases	Value
Mackerel	94,723	$253,572	Whitefish roe and caviar	896	$34,047
Fish flakes[1]	12,552	104,575	Miscellaneous fish and roe[3]	10,105	60,054
Fish cakes, balls, etc.	64,556	463,107	Crabs	5,039	80,581
Cat and dog food	117,255	286,455	Turtle products	3,063	62,879
Salmon roe and caviar	4,288	28,166	Miscellaneous shellfish[4]	2,545	24,447
Salmon eggs (for bait)	4,204	95,415			
Shad roe	1,945	51,915	Total	324,312	1,876,362
Sturgeon caviar[2]	2,541	330,149			

[1] Tuna flakes are not included in this table but are included in the table for canned tuna and tunalike fishes.

[2] Produced principally from imported sturgeon.

[3] Includes shad, smoked salmon, fillets, finnan haddie, fish chowder, pickled and smoked eels, tuna and noodles, spiced sea herring, carp for fish food, miscellaneous roe, etc.

[4] Includes clam cakes, shrimp creole, pickled mussels, conch products, terrapin products, and sea cucumber.

NOTE.—"Standard cases" represent the various sized cases converted to the equivalent of 48 1-pound cans to the case.

Production of miscellaneous byproducts

Product	Atlantic and Gulf coasts		Pacific coast (including Alaska)		Total	
	Quantity	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
Dried scrap:						
Alewife ... tons	705	$17,239			705	$17,239
Blue crab ... do	950	8,570			950	8,570
King crab ... do	342	8,475			342	8,475
Miscellaneous [1] ... do	829	19,229			829	19,229
Meal:						
Herring (Alaska) ... do			9,609	$229,906	9,609	229,906
Herring (Maine) ... do	654	14,456			654	14,456
Pilchard ... do			25,445	587,528	25,445	587,528
Salmon ... do			1,389	35,604	1,389	35,604
Tuna ... do			4,123	92,551	4,123	92,551
Ground fish "white fish" ... do	9,088	363,798			9,088	363,798
Shrimp ... do	513	6,642	172	3,440	685	10,082
Miscellaneous [2] ... do	1,179	42,122	3,269	69,330	4,448	111,452
Miscellaneous green scrap [3] ... do	86	1,035			86	1,035
Oil:						
Alewife ... gallons	22,590	2,446			22,590	2,446
Cod and cod-liver—						
Medicinal ... do	24,806	12,401			24,806	12,401
Industrial ... do	77,061	31,633			77,061	31,633
Herring (Alaska) ... do			2,505,709	256,619	2,505,709	256,619
Herring (Maine) ... do	28,876	3,253			28,876	3,253
Pilchard ... do			5,528,946	704,740	5,528,946	704,740
Salmon ... do			154,040	16,049	154,040	16,049
Tuna ... do			30,667	4,382	30,667	4,382
Whale—						
Sperm ... do			7,208	884	7,208	884
Other ... do			801,011	82,879	801,011	82,879
Miscellaneous [4] ... do	5,070	1,806	12,243	1,677	17,313	3,483
Liquid glue ... do	[5] 365,907	[5] 648,461	(5)	(5)	365,907	648,461
Miscellaneous by-products [6] ... pounds	107,017	22,308	2,517,485	111,625	2,624,502	133,933
Total		1,203,874		2,197,214		3,401,088

[1] Includes ground fish, herring, and miscellaneous dried scrap.
[2] Includes blue crab, clam, salmon egg, mackerel, whale meat and bone, and miscellaneous meal.
[3] Includes herring pomace (Maine) and miscellaneous green scrap.
[4] Includes mackerel, shark, and miscellaneous fish oil.
[5] A quantity of liquid glue produced by 1 firm in California is included with the production of the Atlantic and Gulf coasts.
[6] Includes pearl essence, fish-scale ornaments, shark skins and fins, agar, and kelp products.

NOTE.—The oils produced on the Pacific coast are reported in trade gallons (7½ pounds) and those produced on the Atlantic and Gulf coasts are reported in United States gallons (about 7.74 pounds).

Production of oyster-shell products

State	Crushed oyster-shell for poultry feed		Oyster-shell lime		Total	
	Tons	*Value*	*Tons*	*Value*	*Tons*	*Value*
Rhode Island and Delaware	1,035	$10,507	323	$1,281	1,358	$11,788
New Jersey	4,337	41,142	1,373	5,732	5,710	46,874
Pennsylvania	3,152	31,370	822	3,274	3,974	34,644
Maryland	28,271	167,838	15,289	24,455	43,560	192,293
Virginia	15,508	113,322	[1] 13,926	62,738	29,434	176,060
North Carolina and South Carolina	10,415	57,903	910	4,137	11,325	62,040
Florida	61,836	255,589	1,259	2,238	63,095	257,827
Alabama and Texas	7,357	38,164	9,475	8,119	16,832	46,283
Mississippi	23,131	132,317	2,073	787	25,204	133,104
Louisiana	79,775	359,863	1,385	1,312	81,160	361,175
Washington	[2] 1,646	14,461			1,646	14,461
California	[3] 21,908	118,014	2,446	10,398	24,354	128,412
Total	258,371	1,340,490	49,281	124,471	307,652	1,464,961

[1] Of this amount, 7,626 tons, valued at $44,688 were reported as "burned" lime.
[2] This production was made from clam shells.
[3] Includes a small amount of crushed clam shells for poultry feed.

NOTE.—Crushed oyster-shell products were prepared at 2 plants in Rhode Island, 5 in New Jersey, 5 in Pennsylvania, 1 in Delaware, 6 in Maryland, 8 in Virginia, 3 in North Carolina, 4 in South Carolina, 3 in Florida, 2 in Alabama, 6 in Mississippi, 4 in Louisiana, 2 in Texas, and 5 in California; and clam-shell products were prepared at 1 plant in California and 4 in Washington.

Production of fresh-water mussel-shell products

Item	Iowa		New York		Other States		Total	
	Quantity	*Value*	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
Pearl buttons..gross..	10,501,702	$2,325,071	3,951,787	$890,074	730,983	$163,778	15,184,472	$3,378,923
Crushed shell for poultry feed.......tons..	6,788	53,274			490	2,790	7,278	56,064
Lime..........do....	1,081	1,081	(1)	(1)	104	337	1,185	1,418
Other products [2]......		119,855						119,855
Total..........		2,499,281		890,074		166,905		3,556,260

[1] A small production made in New York has been included with "Other States."
[2] Includes stucco, colored shells, and "pearl novelties."

NOTE.—Mussel shells utilized in the above production amounted to 27,296,000 pounds, valued at $282,691. Shells were taken in 15 States in the Mississippi Valley and Great Lakes region. The producing States in the order of their importance were Illinois, which contributed 23 percent of the total quantity; Indiana, 22 percent; Arkansas, 15 percent; Tennessee, 11 percent; Michigan, 7 percent; Iowa, 6 percent; Kentucky, 4 percent; Minnesota, 3 percent; Texas, 3 percent; Ohio, 2 percent; Wisconsin, 1 percent; Mississippi, Alabama, Kansas, and Missouri, each less than one half of 1 percent.

Production of marine pearl-shell products [1]

Item	Maine, Massachusetts, and Connecticut		Rhode Island		New York		New Jersey	
	Gross	*Value*	*Gross*	*Value*	*Gross*	*Value*	*Gross*	*Value*
Pearl buttons..............	1,132,032	$789,014			393,720	$225,794	669,523	$536,541
Novelties [2]...............		90,700		$18,001		22,350		114,300
Total...............		879,714		18,001		248,144		650,841

Item	Pennsylvania, Maryland, and Florida		California		Total	
	Gross	*Value*	*Gross*	*Value*	*Gross*	*Value*
Pearl buttons..............	1,644,018	$952,954			3,839,293	$2,504,303
Novelties [2]...............		82,605		$31,760		359,716
Total...............		1,035,559		31,760		2,864,019

[1] Produced principally from imported shells.
[2] Includes buckles, inlays for jewelry, knife handles, lamps, handles for manicure sets, ornaments, etc.

NOTE.—Marine pearl-shell products were manufactured at 1 plant in Maine, 2 in Massachusetts, 3 in Rhode Island, 6 in Connecticut, 9 in New York, 22 in New Jersey, 3 in Pennsylvania, 1 in Maryland, 3 in Florida, and 3 in California.

Fish utilized and products of the menhaden industry

State	Menhaden utilized	Products						
		Dry scrap and meal		Acidulated scrap		Oil		Total
	Number	*Tons*	*Value*	*Tons*	*Value*	*Gallons*	*Value*	*Value*
New Jersey, Georgia, and Florida................	167,324,000	7,200	$178,413	5,096	$54,432	853,026	$76,460	$309,305
Virginia................	323,697,000	24,035	533,797			1,865,513	175,597	709,394
North Carolina..............	69,396,000	5,309	121,479	1,745	18,460	278,559	21,429	161,368
Total................	[1] 560,417,000	[2] 36,544	833,689	6,841	72,892	2,997,098	273,486	1,180,067

[1] 336,250,000 pounds.
[2] Of this quantity 32,382 tons, valued at $720,372, were reported as dry scrap, and 4,162 tons, valued at $113,317, as fish meal.

NOTE.—The menhaden factories were located as follows: 2 in New Jersey, 10 in Virginia, 6 in North Carolina, 1 in Georgia, and 5 in Florida.

PACKAGED-FISH TRADE

In 1932 the production of fresh and frozen packaged fish in the United States amounted to 51,975,862 pounds, valued at $5,741,418. The most important species packaged was haddock, which alone accounted for 33,401,425 pounds, valued at $3,356,535.

Production of fresh and frozen packaged fish in the United States, 1932

Species	Maine		Massachusetts and Connecticut		New York	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Blue pike					186,644	$24,939
Cod	408,117	$63,095	5,231,076	$524,003	2,146,500	269,486
Cusk	187,071	32,264	299,137	37,814		
Flounders, including "sole"	(1)	(1)	[1] 1,214,379	[1] 198,589	385,300	58,545
Haddock	259,616	42,898	30,478,578	2,978,840	2,568,231	320,857
Hake	247,826	39,607	1,365,433	122,037	314,500	32,400
Halibut			131,301	29,482		
Mackerel			79,976	10,643		
Pollock			501,151	35,018		
Salmon			80,075	15,692		
Wolffish			180,928	16,309		
Yellow perch					9,783	1,879
Miscellaneous [4]			1,028,021	95,394	1,000	250
Total	1,102,630	177,864	40,590,055	4,063,821	5,561,958	708,356

Species	Pennsylvania		Virginia and North Carolina		Florida and Alabama	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Blue pike	364,822	$65,873				
Croaker			27,000	$3,360		
Flounders, including "sole"			17,500	2,980		
Groupers					345,569	$35,590
Haddock			95,000	13,940		
Sauger pike	(3)	(3)				
Snapper, red, and red rockfish					[2] 107,230	[2] 14,648
Spanish mackerel			3,800	684	28,343	5,651
Squeteague or "sea trout"			93,000	14,100	44,453	9,659
Yellow perch	52,310	9,335				
Yellow pike	(3)	(3)				
Miscellaneous [4]	1,101	254			47,725	9,888
Total	418,233	75,462	236,300	35,064	573,320	75,436

Species	Ohio, Illinois, Kentucky, and Wisconsin		Oregon and Washington		Total	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Blue pike	1,390,574	$265,146			1,892,040	$355,958
Cod					7,785,693	856,584
Croaker					27,000	3,360
Cusk					486,208	70,078
Flounders, including "sole"			70,219	$6,383	1,687,398	266,497
Groupers					345,569	35,590
Haddock					33,401,425	3,356,585
Hake					1,927,759	194,044
Halibut			230,000	22,940	361,301	52,422
Mackerel					79,976	10,643
Pollock					501,151	35,018
Salmon			88,000	10,400	168,075	26,092
Sauger pike	[3] 142,250	[3] 28,291			142,250	28,291
Snapper, red, and red rockfish			(2)	(2)	107,230	14,648
Spanish mackerel					32,143	6,335
Squeteague or "sea trout"					137,453	23,759
Wolffish					180,928	16,309
Yellow perch	1,519,245	262,600			1,581,338	273,814
Yellow pike	[3] 28,478	[3] 6,715			28,478	6,715
Miscellaneous [4]	6,600	1,620	18,000	1,320	1,102,447	108,726
Total	3,087,147	564,372	406,219	41,043	[5] 51,975,862	[5] 5,741,418

[1] A small amount of flounders in Maine has been included with Massachusetts and Connecticut.

[2] A small amount of red rockfish in Oregon has been included with Florida and Alabama.

[3] A small amount of sauger pike and yellow pike in Pennsylvania has been included with Ohio, Illinois, Kentucky, and Wisconsin.

[4] Includes bluefish, red drum or redfish, frog legs, kingfish, lake trout, "lingcod", mullet, pompano, sauger pike, sea bass, snooks, sunfish, swordfish, whitefish, and whiting.

[5] Of this amount 49,228,247 pounds, valued at $5,401,887, were fillets; 35,352 pounds, valued at $4,265, were pandressed; 963,687 pounds, valued at $124,630, were steaks; 1,745,476 pounds, valued at $209,077, were sticks; and 3,100 pounds, valued at $1,550, were prepared by other methods. Of the total quantity of fillets prepared 35,390,632 pounds valued at $4,285,427, were fresh; and 13,837,615 pounds, valued at $1,116,460, were frozen. Of the pandressed 22,828 pounds, valued at $1,878, were fresh; and 12,524 pounds, valued at $2,387, were frozen. Of the steaks 325,042 pounds, valued at $48,831, were fresh; and 638,645 pounds, valued at $75,808, were frozen. Of the sticks 792,699 pounds, valued at $131,376, were fresh; and 952,777 pounds, valued at $77,701, were frozen. There were prepared by other methods 3,100 pounds, valued at $1,550.

NOTE.—Fish products were packaged at 8 plants in Maine; 54 in Massachusetts; 1 in Connecticut; 31 in New York; 8 in Pennsylvania; 7 in Virginia; 1 in North Carolina; 10 in Florida; 1 in Alabama; 29 in Ohio; 6 in Illinois; 1 in Kentucky; 4 in Wisconsin; 4 in Oregon; and 5 in Washington—a total of 170 plants.

FROZEN FISH TRADE[2]

FISH FROZEN

In 1932 the freezing plants in the United States and Alaska, reporting their activities to the Government, packed 92,471,545 pounds of frozen fishery products. These products at the time they were held in cold-storage plants were estimated to be valued at $7,000,000. Compared with the pack in 1931, this is a decrease of 18 percent. Over 65 percent of the pack consisted of six species or groups of fishery products. Of first importance was mackerel, with 17 percent of the total. Of next importance was the cod, haddock, haddock fillets, hake, and pollock group, with 16 percent of the total. Haddock fillets accounted for the bulk of the volume of this group. Salmon made up 12 percent of the total; halibut, 10 percent; whiting, 6 percent; and shellfish, 4 percent. Considerable quantities of sea herring, squid, croaker, cisco or lake herring, smelts, and weakfish, including southern "sea trout", also were frozen. Frozen squid and sea herring are marketed primarily for bait, although quantities of each are used for human consumption.

Production of frozen fishery products, 1932

BY SPECIES AND MONTHS

Species	Month ended the 15th of—						
	January	February	March	April	May	June	July
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Bluefish (all trade sizes)	10,159	13,777	4,804	13,194	5,128	27,432	27,703
Butterfish (all trade sizes)	12,725	10,289	9,788	45,212	62,369	162,540	209,848
Catfish	12,998	29,277	6,239	27,572	34,081	14,543	27,946
Cisco (Lake Erie)	69,202		183	12,935	8,200	4,132	18,401
Cisco (lake herring), including bluefin, blackfin, and chub	66,425	1,821	15,105	19,997	71,221	50,111	98,710
Cisco (tullibees, Canadian lakes)	59,159	42,488	36,310	9,423	12,813	6,746	8,795
Cod, haddock, hake, and pollock	252,490	140,950	116,809	242,860	161,508	149,865	203,384
Croaker	19,224	11,758	7,918	6,678	258,945	62,980	60,347
Flounders	18,666	34,393	8,219	9,401	56,647	125,951	21,917
Haddock fillets	797,402	603,564	268,068	1,499,030	1,582,088	913,915	1,073,454
Halibut (all trade sizes)	333,059	204,335	764,259	561,014	1,729,962	508,109	1,302,245
Herring, sea (including alewives and bluebacks)	187,591	116,543	123,245	183,108	1,038,274	345,059	72,703
Lake trout	47,125	28,252	18,000	22,379	46,999	32,956	42,466
Mackerel (except Spanish)	127,501	155,044	126,437	84,438	1,014,754	954,841	2,961,879
Pike, blue and sauger	42,571	1,730	10,553	128,068	236,849	273,623	31,992
Pike, yellow or wall-eyed	65,120	8,609	43,765	9,817	20,053	13,339	6,943
Pike (including pickerel, jacks, and yellow jack)	70,675	79,702	41,556	12,082	25,239	15,551	11,680
Sablefish (black cod)	36,428	22,841	42,784	13,731	58,461	74,500	182,843
Salmon, chinook or king	1,000	4,352	2,331	5,458	67,805	480,788	707,281
Salmon, silver or coho	32,098	29,366	30,191	9,939	46,840	15,396	158,390
Salmon, fall and pink	90,390	22,268	41,759	6,265	12,478	6,000	1,577
Salmon, steelhead trout		184	41,828	26,761	12,910	1,132	92,458
Salmon, red or sockeye[1]	60,634	81,139	58,814	59,957	184,236	451,979	139,438
Scup (porgies)	2,516	1,148	1,905		1,910	159,722	15,963
Shad and shad roe	59,905	34,309	16,286	5,373	36,108	60,703	47,041
Shellfish	372,114	289,064	211,921	63,909	215,643	280,727	260,904
Smelts, eulachon, etc	216,136	382,228	207,771	18,199	3,558	2,462	18,420
Squid	7,520	15,855	1,443	575	902,540	1,376,960	252,539
Sturgeon and spoonbill cat	2,081	4,105	1,084	5,315	23,704	39,940	18,788
Suckers	655	100	50	940	7,381	5,676	2,220
Weakfish (including southern "sea trout")	31,516	36,775	27,714	2,308	180,101	64,916	136,875
Whitefish	60,604	40,577	17,707	88,307	19,188	54,400	259,522
Whiting	56,543	105,814	113,811	11,800	162,787	2,620,610	1,828,796
Miscellaneous fish	845,294	620,274	477,513	689,915	992,674	909,313	770,467
Total	4,067,526	3,172,991	2,896,170	3,846,050	9,293,514	10,272,423	11,124,031

[1] Prior to July 15, 1932, this item was listed as "Salmon, all other" and may have included species properly classified in one of the other groups of salmon.

[2] The statistics in this section have been furnished by the Bureau of Agricultural Economics, Department of Agriculture.

Production of frozen fishery products, 1932—Continued

BY SPECIES AND MONTHS—Continued

Species	Month ended the 15th of—					
	August	September	October	November	December	Total
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Bluefish (all trade sizes)	449, 510	93, 766	117, 542	25, 747	12, 249	801, 011
Butterfish (all trade sizes)	163, 586	18, 854	78, 242	100, 101	14, 109	887, 663
Catfish	22, 201	17, 080	31, 488	61, 449	34, 909	819, 783
Cisco (Lake Erie)	38, 604	46, 142	29, 454	42, 694	8, 809	278, 756
Cisco (lake herring), including bluefin, blackfin, and chub	259, 562	115, 281	109, 727	246, 632	583, 942	1, 644, 534
Cisco (tullibees, Canadian lakes)	24, 493	39, 649	7, 066	61, 499	57, 855	361, 296
Cod, haddock, hake, and pollock	480, 532	420, 618	405, 815	263, 761	177, 724	3, 016, 316
Croaker	415, 307	318, 471	8, 300	6, 933	7, 812	1, 184, 173
Flounders	22, 918	31, 051	52, 631	51, 473	98, 234	531, 501
Haddock fillets	1, 346, 934	1, 742, 048	1, 198, 339	471, 763	298, 365	11, 794, 970
Halibut (all trade sizes)	1, 405, 182	1, 161, 031	682, 499	588, 834	171, 401	9, 471, 930
Herring, sea (including alewives and bluebacks)	429, 563	509, 675	252, 168	229, 974	386, 757	3, 874, 660
Lake trout	54, 145	13, 082	110, 385	462, 283	44, 633	922, 705
Mackerel (except Spanish)	3, 013, 960	3, 361, 334	3, 511, 799	617, 622	204, 338	16, 133, 447
Pike, blue and sauger	653	32, 654	47, 856	66, 072	90, 764	963, 385
Pike, yellow or wall-eyed	11, 901	16, 241	19, 132	13, 754	9, 053	237, 727
Pike (including pickerel, jacks, and yellow jack)	9, 294	9, 031	14, 444	30, 416	7, 241	326, 917
Sablefish (black cod)	187, 327	255, 554	390, 500	206, 956	24, 813	1, 496, 738
Salmon, chinook or king	580, 024	478, 720	263, 981	91, 210	7, 209	2, 690, 219
Salmon, silver or coho	1, 576, 143	1, 588, 444	1, 229, 857	815, 244	76, 607	5, 608, 515
Salmon, fall and pink	105, 441	189, 169	287, 350	573, 241	29, 356	1, 315, 294
Salmon, steelhead trout	149, 065	66, 578	17, 643	2, 368	1, 294	412, 221
Salmon, red or sockeye [1]	114, 578	104, 483	137, 761	39, 123	40, 067	1, 472, 209
Scup (porgies)	35, 150	25, 221	2, 898	2, 179	200	248, 812
Shad and shad roe	3, 622	106, 781	14, 220	20, 108	20, 096	424, 612
Shellfish	298, 892	510, 367	588, 362	548, 738	257, 994	3, 898, 815
Smelts, eulachon, etc.	7, 191	16, 703	10, 909	43, 197	157, 083	1, 078, 857
Squid	131, 913	29, 956	29, 372	51, 196	5, 628	2, 805, 497
Sturgeon and spoonbill cat	33, 200	8, 321	10, 075	11, 634	1, 732	159, 979
Suckers	473	2, 059	4, 772	4, 630	470	29, 426
Weakfish (including southern "sea trout")	256, 528	181, 822	89, 625	37, 133	8, 692	1, 054, 005
Whitefish	119, 180	127, 032	99, 096	27, 211	61, 116	923, 940
Whiting	269, 728	124, 125	61, 213	112, 159	177, 418	5, 644, 810
Miscellaneous fish	951, 803	832, 541	820, 971	1, 101, 462	1, 444, 595	10, 456, 822
Total	12, 968, 603	12, 543, 884	10, 735, 492	7, 028, 796	4, 522, 065	92, 471, 545

BY GEOGRAPHICAL SECTIONS AND SPECIES [2]

[Expressed in thousands of pounds; that is, 000 omitted]

Species	New England	Middle Atlantic	South Atlantic	North Central, East	North Central, West	South Central	Pacific	Total
Bluefish (all trade sizes)	22	678	5	47	1	48	--------	801
Butterfish (all trade sizes)	279	536	33	40	--------	--------	--------	888
Catfish	35	1	81	66	138	49	--------	320
Cisco (Lake Erie)	--------	276	3	--------	--------	--------	--------	279
Cisco (lake herring), including bluefin, blackfin, and chub	--------	509	--------	794	342	--------	--------	1, 645
Cisco (tullibees, Canadian lakes)	38	171	3	116	33	--------	--------	361
Cod, haddock, hake, and pollock	2, 325	233	3	72	225	1	157	3, 016
Croaker	--------	155	851	176	--------	2	--------	1, 184
Flounders	275	219	9	5	17	--------	6	531
Haddock fillets	10, 779	252	32	419	151	46	116	11, 795
Halibut (all trade sizes)	240	588	51	617	111	18	7, 847	9, 472
Herring, sea (including alewives and bluebacks)	2, 769	207	17	488	1	14	379	3, 875

[1] Prior to July 15, 1932, this item was listed as "Salmon, all other" and may have included species properly classified in one of the other groups of salmon.

[2] New England includes the 6 States of that section; Middle Atlantic—New York, New Jersey, and Pennsylvania; South Atlantic—Delaware, Maryland, District of Columbia, Virginia, West Virginia, North Carolina, South Carolina, Georgia, and Florida; North Central, East—Ohio, Indiana, Illinois, Michigan, and Wisconsin; North Central, West—Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, and Kansas; South Central—Kentucky, Tennessee, Alabama, Mississippi, Louisiana, Texas, Oklahoma, and Arkansas; Pacific—Washington, Oregon, California, and Alaska.

Production of frozen fishery products, 1932—Continued

BY GEOGRAPHICAL SECTIONS AND SPECIES—Continued

[Expressed in thousands of pounds; that is, 000 omitted]

Species	New England	Middle Atlantic	South Atlantic	North Central, East	North Central, West	South Central	Pacific	Total
Lake trout	1	119		659	134	3	7	923
Mackerel (except Spanish)	14,280	1,357	3	267	17	11	198	16,183
Pike, blue and sauger		427		535		1		963
Pike, yellow or wall-eyed		61		40	131			238
Pike (including pickerel, jacks, and yellow jack)		9		103	215			327
Sablefish (black cod)		2		156	25		1,314	1,497
Salmon, chinook or king	79	45		17	11		2,538	2,690
Salmon, silver or coho	58	215		39	30	2	5,265	5,609
Salmon, fall and pink	64	13	2	17	24		1,195	1,315
Salmon, steelhead trout	3	28	40	1			340	412
Salmon, red or sockeye [1]	10	246	3	180	22	2	1,009	1,472
Scup (porgies)	21	88	140					249
Shad and shad roe	110	160	3	56	3	1	92	425
Shellfish	543	1,607	300	561	132	11	745	3,899
Smelts, eulachon, etc	33	850	2	93	3		98	1,079
Squid	1,774	1,018					13	2,805
Sturgeon and spoonbill cat		103	3	10	13	20	11	160
Suckers		1		28				29
Weakfish (including southern "sea trout")		794	259	1				1,054
Whitefish	4	492	26	376	20	5	1	924
Whiting	4,846	595	60		143	1		5,645
Miscellaneous fish	1,268	1,268	1,418	2,510	481	1,585	1,927	10,457
Total	39,856	13,323	3,297	8,495	2,423	1,820	23,258	92,472

BY GEOGRAPHICAL SECTIONS AND MONTHS

[Expressed in thousands of pounds; that is, 000 omitted]

Month ended the 15th of—	New England	Middle Atlantic	South Atlantic	North Central, East	North Central, West	South Central	Pacific	Total
January	1,287	1,106	157	550	282	186	500	4,068
February	592	950	228	567	293	85	458	3,173
March	207	635	62	410	296	53	1,233	2,896
April	1,801	141	40	810	99	179	776	3,846
May	4,121	1,502	341	895	70	138	2,227	9,294
June	5,429	1,649	267	830	111	246	1,740	10,272
July	6,287	1,208	202	483	95	169	2,680	11,124
August	5,809	1,712	719	495	108	107	4,019	12,969
September	6,493	1,156	428	432	61	122	3,854	12,544
October	5,426	1,160	129	500	155	163	3,202	10,735
November	1,605	1,070	168	1,263	386	235	2,302	7,029
December	799	1,034	558	1,260	467	137	267	4,522
Total	39,856	13,323	3,297	8,495	2,423	1,820	23,258	92,472

[1] Prior to July 15, 1932, this item was listed as "Salmon, all other" and may have included species properly classified in one of the other groups of salmon.

HOLDINGS

During 1932 monthly holdings of frozen fish and shellfish averaged 47,714,000 pounds, which is 13 percent less than the average monthly holdings in 1931. The holdings in January were largest, amounting to 64,478,000 pounds. The holdings in February and in each of the months from August to December exceeded 50,000,000 pounds. The smallest holdings were in April, when only 25,916,000 pounds of frozen fish were in storage.

Holdings of frozen fishery products, 1932

BY SPECIES AND MONTHS

Species	Month ended the 15th of—					
	January	February	March	April	May	June
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Bluefish (all trade sizes)	911, 994	768, 158	569, 090	502, 516	445, 358	429, 705
Butterfish (all trade sizes)	1, 311, 954	908, 759	533, 063	265, 782	242, 517	351, 967
Catfish	471, 838	420, 759	281, 774	187, 818	183, 003	155, 316
Cisco (Lake Erie)	198, 597	116, 953	50, 192	14, 259	9, 065	11, 158
Cisco (lake herring), including bluefin, blackfin, and chub	1, 443, 836	822, 192	523, 838	255, 347	231, 813	222, 991
Cisco (tullibees, Canadian lakes)	677, 938	664, 024	606, 979	556, 493	536, 042	521, 440
Cod, haddock, hake, and pollock	1, 330, 507	984, 937	507, 367	1, 030, 315	918, 864	840, 497
Croaker	906, 921	685, 105	371, 980	129, 572	353, 555	412, 246
Flounders	437, 162	376, 207	233. 079	151, 548	181, 158	244, 141
Haddock fillets	5, 618, 864	5, 009, 868	3, 628, 732	2, 880, 764	3, 257, 797	3, 149, 331
Halibut (all trade sizes)	5, 956, 454	3, 718, 728	2, 875, 034	2, 476, 163	4, 052, 388	4, 399, 501
Herring, sea (including alewives and bluebacks)	2, 627, 487	2, 127, 405	1, 569, 052	1, 278, 293	1, 968, 595	1, 895, 455
Lake trout	1, 128, 660	936, 916	599, 968	308, 394	315, 455	317, 929
Mackerel (except Spanish)	8, 561, 678	6, 527, 700	4, 025, 132	1, 991, 957	2, 317, 788	3, 060, 393
Pike, blue and sauger	666, 253	458, 923	212, 171	209, 681	402, 122	572, 032
Pike, yellow or wall-eyed	382, 597	291, 769	173, 571	104, 240	128, 310	134, 872
Pike (including pickerel, jacks, and yellow jack)	479, 812	384, 913	337, 959	262, 476	246, 959	232, 110
Sablefish (black cod)	1, 123, 303	800, 660	636, 450	467, 313	420, 766	395, 807
Salmon, chinook or king	767, 366	431, 370	218, 901	108, 365	96, 471	443, 213
Salmon, silver or coho	3, 015, 744	1, 764, 947	953, 469	658, 077	416, 821	267, 146
Salmon, fall and pink	1, 287, 569	885, 460	630, 073	549, 559	436, 934	396, 778
Salmon, steelhead trout	997, 685	910, 747	802, 446	685, 046	641, 732	626, 315
Salmon, red or sockeye [1]	1, 555, 002	1, 170, 552	947, 130	548, 637	607, 521	895, 864
Scup (porgies)	369, 651	277, 047	195, 284	158, 010	132, 534	299, 765
Shad and shad roe	492, 634	431, 936	325, 901	255, 563	186, 643	221, 388
Shellfish	2, 720, 159	2, 620, 420	2, 295, 716	1, 852, 048	1, 281, 001	1, 280, 468
Smelts, eulachon, etc	665, 251	1, 181, 413	972, 147	265, 985	223, 891	212, 356
Squid	840, 343	689, 602	432, 976	176, 619	1, 027, 520	2, 364, 860
Sturgeon and spoonbill cat	716, 733	483, 299	763, 670	589, 837	574, 883	497, 833
Suckers	37, 295	12, 620	8, 910	3, 531	10, 762	14, 691
Weakfish (including southern "sea trout")	1, 206, 059	636, 618	220, 009	83, 248	214, 038	264, 409
Whitefish	1, 251, 853	1, 067, 554	846, 216	511, 091	368, 366	356, 335
Whiting	4, 883, 795	3, 917, 506	2, 502, 803	1, 986, 570	1, 621, 107	3, 969, 426
Miscellaneous fish	9, 434, 788	8, 116, 202	5, 713, 328	4, 410, 522	4, 575, 352	4, 847, 184
Total	64, 477, 782	50, 601, 269	35, 564, 410	25, 915, 639	28, 622, 126	34, 310, 922

Species	Month ended the 15th of—					
	July	August	September	October	November	December
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Bluefish (all trade sizes)	492, 130	825, 689	769, 871	787, 107	679, 598	673, 093
Butterfish (all trade sizes)	491, 397	620, 610	564, 252	586, 024	583, 442	445, 024
Catfish	161, 006	151, 201	129, 346	136, 894	171, 532	220, 321
Cisco (Lake Erie)	41, 771	71, 903	136, 882	142, 882	279, 001	302, 796
Cisco (lake herring), including bluefin, blackfin, and chub	257, 483	497, 536	495, 711	557, 054	591, 776	937, 887
Cisco (tullibees, Canadian lakes)	491, 168	596, 697	670, 068	715, 336	609, 885	604, 262
Cod, haddock, hake, and pollock	903, 729	1, 270, 291	1, 508, 040	1, 090, 800	1, 010, 503	934, 642
Croaker	458, 291	880, 094	1, 207, 274	982, 258	852, 927	776, 863
Flounders	229, 514	215, 295	187, 686	179, 640	179, 626	232, 015
Haddock fillets	3, 484, 618	3, 999, 593	4, 780, 689	4, 754, 194	3, 692, 032	2, 817, 606
Halibut (all trade sizes)	5, 614, 215	6, 957, 557	7, 975, 140	7, 732, 624	7, 150, 616	4, 984, 651
Herring, sea (including alewives and bluebacks)	1, 682, 081	1, 741, 288	1, 834, 665	1, 770, 782	1, 747, 253	1, 942, 034
Lake trout	859, 934	394, 718	349, 217	439, 745	863, 787	777, 902
Mackerel (except Spanish)	5, 649, 791	8, 297, 979	11, 136, 686	14, 130, 518	13, 900, 718	12, 315, 010
Pike, blue and sauger	501, 799	407, 587	379, 681	394, 959	402, 467	448, 761
Pike, yellow or wall-eyed	117, 631	118, 277	128, 392	139, 474	137, 997	164, 497
Pike (including pickerel, jacks, and yellow jack)	206, 572	201, 290	198, 748	248, 842	245, 257	182, 647
Sablefish (black cod)	502, 331	631, 293	805, 521	1, 095, 704	1, 068, 344	906, 076
Salmon, chinook or king	1, 384, 760	1, 947, 210	2, 310, 507	2, 324, 761	2, 189, 758	1, 959, 040
Salmon, silver or coho	363, 747	2, 019, 831	3, 474, 599	4, 485, 205	4, 872, 948	4, 296, 239
Salmon, fall and pink	409, 020	529, 556	594, 302	820, 388	1, 307, 858	1, 106, 801
Salmon, steelhead trout	623, 103	689, 280	697, 699	606, 736	576, 183	513, 890
Salmon, red or sockeye [1]	397, 323	460, 100	524, 953	661, 904	571, 887	551, 101

[1] Prior to July 15, 1932, this item was listed as "Salmon, all other" and may have included species properly classified in one of the other groups of salmon.

Holdings of frozen fishery products, 1932—Continued

BY SPECIES AND MONTHS—Continued

Species	Month ended the 15th of— July	August	September	October	November	December
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Scup (porgies)	300, 748	334, 167	353, 555	343, 939	322, 698	262, 527
Shad and shad roe	236, 668	187, 910	270, 410	253, 358	249, 578	230, 661
Shellfish	1, 438, 877	1, 354, 759	1, 248, 837	1, 582, 603	1, 785, 985	1, 899, 675
Smelts, eulachon, etc	197, 392	186, 915	191, 507	180, 362	240, 171	258, 631
Squid	2, 559, 458	2, 604, 517	2, 423, 032	2, 222, 493	2, 097, 601	1, 850, 703
Sturgeon and spoonbill cat	606, 572	556, 352	520, 944	767, 336	730, 161	846, 451
Suckers	14, 160	11, 378	12, 207	16, 103	19, 995	14, 136
Weakfish (including southern "sea trout")	384, 826	624, 120	689, 489	684, 680	665, 852	878, 290
Whitefish	660, 006	1, 181, 026	1, 733, 576	1, 761, 807	1, 736, 548	1, 606, 440
Whiting	5, 246, 188	5, 364, 879	5, 106, 113	4, 732, 202	4, 516, 083	3, 681, 339
Miscellaneous fish	4, 837, 376	5, 650, 462	5, 859, 569	5, 744, 308	6, 103, 730	6, 116, 659
Total	41, 305, 685	51, 581, 355	59, 269, 168	63, 073, 022	62, 103, 792	55, 738, 170

BY GEOGRAPHICAL SECTIONS AND MONTHS [2]

[Expressed in thousands of pounds; that is, 000 omitted]

Month ended the 15th of —	New England	Middle Atlantic	South Atlantic	North Central, East	North Central, West	South Central	Pacific [3]	Total
January	18, 958	16, 269	3, 738	7, 998	3, 695	886	12, 934	64, 478
February	14, 867	14, 017	3, 140	6, 090	3, 297	860	8, 330	50, 601
March	9, 011	10, 527	1, 919	4, 075	2, 893	700	6, 439	35, 564
April	5, 664	7, 351	994	3, 302	2, 461	576	5, 568	25, 916
May	7, 068	7, 011	1, 043	3, 735	2, 230	587	6, 948	28, 622
June	10, 736	7, 802	1, 253	3, 864	2, 057	681	7, 918	34, 311
July	15, 302	8, 578	1, 391	3, 762	1, 904	647	9, 722	41, 306
August	19, 641	10, 078	2, 086	3, 717	1, 850	581	13, 628	51, 581
September	23, 895	10, 118	2, 505	3, 787	1, 715	581	16, 668	59, 269
October	25, 879	10, 628	2, 435	3, 731	2, 056	561	17, 783	63, 073
November	24, 167	10, 813	2, 623	4, 904	2, 333	592	16, 672	62, 104
December	20, 311	11, 046	3, 128	5, 372	2, 401	594	12, 886	55, 738
Average	16, 292	10, 353	2, 188	4, 528	2, 408	654	11, 291	47, 714

[2] New England includes the 6 States of that section; Middle Atlantic—New York, New Jersey, and Pennsylvania; South Atlantic—Delaware, Maryland, District of Columbia, Virginia, West Virginia, North Carolina, South Carolina, Georgia, and Florida; North Central, East—Ohio, Indiana, Illinois, Michigan, and Wisconsin; North Central, West—Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, and Kansas; South Central—Kentucky, Tennessee, Alabama, Mississippi. Louisiana, Texas, Oklahoma, and Arkansas; Pacific—Washington, Oregon, California, and Alaska.

[3] Includes a very small amount of fish held in Colorado in the Mountain section.

COLD-STORAGE HOLDINGS OF CURED FISH

During 1932, monthly holdings of cured herring and mild-cured salmon averaged 18,183,297 pounds, which is an increase of less than one-half of 1 percent as compared with the average monthly holdings in 1931. The holdings in September were the largest, amounting to 21,097,753 pounds, and the smallest were in July, amounting to 14,255,170 pounds.

Holdings of cured fish, 1932, by species and months

Month ended the 15th of—	Cured herring	Mild-cured salmon	Total	Month ended the 15th of—	Cured herring	Mild-cured salmon	Total
	Pounds	*Pounds*	*Pounds*		*Pounds*	*Pounds*	*Pounds*
January	15, 849, 856	4, 756, 698	20, 606, 554	July	10, 349, 785	3, 905, 385	14, 255, 170
February	15, 549, 801	4, 503, 513	20, 053, 314	August	12, 087, 969	6, 133, 617	18, 221, 586
March	13, 740, 380	3, 020, 793	16, 761, 173	September	14, 351, 194	6, 746, 559	21, 097, 753
April	13, 157, 354	2, 946, 074	16, 103, 428	October	14, 250, 227	6, 779, 642	21, 029, 869
May	13, 303, 682	2, 337, 839	15, 641, 521	November	14, 810, 078	6, 276, 379	21, 086, 457
June	12, 774, 287	2, 672, 757	15, 447, 044	December	12, 986, 672	4, 909, 028	17, 895, 700

FOREIGN FISHERY TRADE

Foreign trade in fishery products in the United States in 1932, amounted to $37,373,744, of which $29,565,731 represents the value of these products imported for consumption, and $7,808,013 the value of exports of domestic fishery products. Compared with the previous year, there was a decrease of 32 percent in the total trade, 31 percent in the value of imports, and 33 percent in the value of exports.

Imports consisted of 259,884,587 pounds of edible products, valued at $21,672,985, and nonedible products, valued at $7,892,746. Fishery exports consisted of 86,932,806 pounds of edible products, valued at $7,657,324, and nonedible products, valued at $150,689.

Exports of domestic fishery products, 1932

Item	Quantity	Value
EDIBLE FISHERY PRODUCTS		
Fish, fresh, frozen, or packed in ice:		
Salmon ... pounds	5,299,020	$484,320
Other fresh fish ... do	3,627,624	201,811
Total ... do	8,926,644	686,131
Fish, salted or dry cured:		
Cod ... do	890,076	93,713
Haddock, hake, and pollock ... do	562,136	32,801
Herring ... do	665,268	33,922
Salmon ... do	1,470,357	157,462
Other ... do	638,379	35,846
Total ... do	4,226,216	353,744
Fish, pickled:		
Salmon ... do	1,933,200	281,166
Other ... do	1,284,800	57,285
Total ... do	3,218,000	338,451
Fish, canned:		
Salmon ... do	32,610,017	3,584,886
Sardines ... do	26,644,525	1,542,399
Mackerel ... do	1,409,168	79,391
Other ... do	469,478	67,387
Total ... do	61,133,188	5,274,063
Shellfish:		
Canned ... do	2,234,485	320,734
Not canned ... do	6,972,007	632,441
Total ... do	9,206,492	953,175
Other fish products ... do	222,266	51,760
Total edible products ... do	86,932,806	7,657,324
NONEDIBLE FISHERY PRODUCTS		
Marine-animal oils ... do	1,477,340	64,678
Buttons, pearl or shell ... gross	140,953	19,219
Sponges ... pounds	61,629	66,792
Total		86,011
Total nonedible products		150,689
Grand total		7,808,013

Imports of fishery products entered for consumption, 1932

Item	Pounds	Value
EDIBLE FISHERY PRODUCTS		
Fish, fresh or frozen:		
Whole, beheaded, or eviscerated or both:		
Salmon	2,931,705	$248,790
Fresh-water fish, not elsewhere specified:		
Yellow pike	6,156,120	530,958
Whitefish	6,627,512	633,542
Tullibees	1,514,767	70,133
Jacks or grass pike	1,781,190	71,977
Lake trout	1,586,622	153,642
Yellow perch	1,117,278	58,689
Lake herring, ciscoes, and chubs	1,315,958	153,469
Fresh water fish, not specially provided for	15,302,968	873,357
Eels	326,307	23,966
Cod, haddock, hake, pollock, and cusk	468,670	19,050
Halibut:		
Fresh	1,307,306	108,048
Frozen	141,267	10,023
Mackerel	583,439	24,827
Swordfish	1,552,512	97,758
Sturgeon	2,153,879	306,254
Fish, not specially provided for	2,259,991	122,669
Whether or not whole:		
Smelts	7,407,283	816,193
Tunafish	5,037,875	297,790
Sea herring:		
Fresh	10,864,454	30,259
Frozen	1,379,422	42,480
Fillets, skinned, boned, sliced, or divided, not specially provided for	1,781,698	194,765
Total	73,598,223	4,888,639
Fish, salted, dried, smoked, pickled, or preserved:		
Dried and unsalted:		
Cod, haddock, hake, pollock, and cusk	368,990	29,104
Other	3,302,208	244,515
In oil or in oil and other substances:		
Sardines	42,335,906	3,562,489
Anchovies	1,853,137	446,160
Antipasto	326,957	107,864
Tunafish	5,999,155	717,146
Other	260,958	33,967
Not in oil or in oil and other substances:		
In air-tight containers weighing with contents, not over 15 pounds each:		
Anchovies	3,036,565	228,020
Salmon	5,807,251	230,044
Herring and sardines	7,117,096	405,255
Fish cakes, balls, and pudding	1,372,277	62,291
Other	1,488,560	125,576
Pickled or salted:		
Not in oil, etc., and not in air-tight containers weighing, with contents, 15 pounds or less each:		
Salmon	247,374	16,214
Cod, haddock, hake, pollock, and cusk, neither skinned nor boned (except that vertebral column may be removed):		
Containing not more than 43 percent moisture by weight	18,405,482	829,753
Containing more than 43 percent moisture by weight	16,756,071	622,271
Cod, haddock, hake, pollock, and cusk, skinned or boned	1,968,650	149,944
Herring:		
In bulk or in containers weighing, with contents, more than 15 pounds each	32,011,053	1,498,514
In containers (not air-tight), weighing, with contents, not more than 15 pounds each (net weight)	201,423	8,857
Mackerel:		
In bulk or in containers weighing, with contents, more than 15 pounds each (net weight)	4,205,949	141,470
Pickled or salted, not specially provided for:		
In bulk or in containers weighing, with contents, more than 15 pounds each (net weight)	1,490,668	105,391
In containers (not air-tight) weighing, with contents, not more than 15 pounds each (net weight)	34,848	3,020
Smoked or kippered:		
Not in oil, etc., and not in air-tight containers weighing, with contents, 15 pounds or less each:		
Salmon	3,328	805
Herring:		
Whole or beheaded	822,874	39,948
Eviscerated, split, skinned, boned, or divided	904,146	67,448
Cod, haddock, hake, pollock, and cusk:		
Whole, or beheaded, or eviscerated or both	676,957	52,787
Filleted, skinned, boned, sliced, or divided	915,242	80,513
Smoked or kippered, not specially provided for	13,155	1,565

Imports of fishery products entered for consumption, 1932—Continued

Item	Pounds	Value
EDIBLE FISHERY PRODUCTS—continued		
Fish, salted, dried, smoked, pickled, or preserved—Continued.		
Prepared or preserved, not specially provided for:		
In containers weighing, with contents, not more than 15 pounds each	93,501	$14,238
In bulk, or in containers weighing, with contents, more than 15 pounds each (net weight)	305,601	29,129
Fish paste and fish sauce	61,742	15,949
Total	151,887,124	9,869,747
Caviar and other fish roe:		
Not boiled, etc.:		
Sturgeon	372,042	448,693
Fish roe, not specially provided for	99,261	14,392
Boiled, packed in air-tight containers	57,781	4,423
Total	529,084	467,508
Shellfish:		
Crab meat, crab sauce, and crab paste	8,869,673	3,111,109
Clams, clam juice, or either in combination with other substances, in air-tight containers	1,483,942	153,792
Oysters, oyster juice, or either in combination with other substances, in air-tight containers	166,320	25,339
Lobsters, (including spiny lobsters and crawfish):		
Not canned	11,694,342	1,941,240
Canned	1,307,078	567,708
Clams not in air-tight containers	2,373,086	30,139
Shrimps and prawns	457,291	57,828
Scallops	367,430	42,040
Oysters, not in air-tight containers	3,521,287	195,897
Shellfish, not specially provided for	3,198,489	294,343
Pastes and sauces of shellfish, not specially provided for	115,840	10,519
Crabs	19,059	1,315
Turtles	296,819	15,822
Total	33,870,156	6,447,091
Total, edible fishery products	259,884,587	21,672,985
NONEDIBLE FISHERY PRODUCTS	*Quantity*	
Marine-animal oils:		
Cod oil ... gallons	3,296,366	919,822
Cod-liver oil ... do	1,247,998	804,375
Eulachon oil ... do	850	425
Herring oil ... do	2,094,417	399,755
Menhaden and sod oil ... do	58,633	8,231
Seal oil ... do	60,383	11,850
Whale oil:		
Sperm, crude ... do	184,645	61,136
Sperm, refined or otherwise processed ... do	50,676	17,714
Whale oil, not specially provided for ... do	5,618,192	2,343,259
Total	12,618,160	4,566,567
Pearls and imitation pearls:		
Pearls and parts, not strung or set		552,908
Imitation pearls:		
Half pearls and hollow or filled		9,426
Solid pearls, not elsewhere specified:		
Valued at more than one-fourth cent and not more than 1 cent an inch ... inches	121,909	840
Valued at more than 5 cents an inch ... do	5,178	524
Iridescent solid pearls:		
Valued at not more than 10 cents per inch ... do	71,910	278
Valued at more than 10 cents per inch ... do	1,932	250
Total		564,226
Shells and buttons of pearl or shell:		
Shells, unmanufactured—		
Green snail shell ... pounds	109,456	8,115
Mother-of-pearl ... do	3,974,903	909,167
Shells, not specially provided for ... do	4,794,724	22,568
Shells and mother-of-pearl, engraved, cut, ornamented, or manufactured		26,363
Shell pearl buttons—Ocean ... gross	930,034	325,486
Total		1,291,699

Imports of fishery products entered for consumption, 1932—Continued

Item	Pounds	Value
NONEDIBLE FISHERY PRODUCTS—continued		
Sponges:		
Sheepswool ... pounds	119,430	$226,489
Yellow, grass, or velvet ... do	224,246	98,148
Other ... do	26,852	47,846
Manufactures of ... do	441	150
Total	370,969	372,633
Agar-agar ... pounds	468,999	194,963
Ambergris ... do	13	2,402
Cod-liver oil cake and cod-liver oil cake meal ... do	1,147,285	20,834
Cuttlefish bone ... do	341,296	31,897
Goldfish, live ... number	1,575,615	12,195
Fish for other than human consumption	------------	115,754
Fish sounds ... pounds	95,947	11,861
Fish scrap and fish meal ... long tons	21,805	530,502
Skins, fish, raw, or salted ... pounds	1,117,648	47,797
Skins, seal, raw (not fur skins) ... do	1,703,549	119,830
Spermaceti wax ... do	80,952	7,093
Whalebone, unmanufactured ... do	767	991
Whalebone, manufactures of	------------	1,502
Total	------------	1,097,621
Total nonedible fishery products	------------	7,892,746
Grand total	------------	29,565,731

FISHERIES OF THE NEW ENGLAND STATES

(Area XXII) [3]

The yield of the commercial fisheries of the New England States (Maine, New Hampshire, Massachusetts, Rhode Island, and Connecticut) during 1932, amounted to 480,520,881 pounds, valued at $14,001,296 to the fishermen, representing a decrease of 10 percent in volume and 28 percent in value as compared with the catch in the previous year. In addition there was a production of 229,192 bushels of seed oysters, valued at $119,785. These fisheries gave employment to 16,580 fishermen, including those in the fishery for seed oysters.

Fisheries of the New England States, 1932

SUMMARY OF CATCH

Product	Maine		New Hampshire		Massachusetts	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Fish	75,595,283	$941,332	523,891	$13,249	335,222,512	$7,384,574
Shellfish, etc	15,006,585	1,471,948	219,803	44,479	12,370,857	1,543,696
Total	90,601,868	2,413,280	743,694	57,728	347,593,369	8,928,270

Product	Rhode Island		Connecticut		Total	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Fish	12,657,715	$354,958	16,918,844	$489,895	440,918,245	$9,184,008
Shellfish, etc	7,878,476	1,136,442	4,126,915	620,723	39,602,636	4,817,288
Total	20,536,191	1,491,400	21,045,759	1,110,618	480,520,881	14,001,296

[3] This is the number given this area by the North American Council on Fishery Investigations. It should be explained that there are included under this area craft owned in the area but at times fishing elsewhere. Notable examples are the ground fish fishery in area XXI and the mackerel and southern trawl fisheries in areas XXIII and XXIV. It should be observed that the persons engaged, gear and craft employed, and catch of the seed oyster fishery are not included among the statistics of the fishery for market oysters and other species but are shown in separate tables in this section.

Fisheries of the New England States, 1932—Continued

OPERATING UNITS: BY STATES

Item	Maine	New Hampshire	Massachusetts	Rhode Island	Connecticut	Total
	Number	*Number*	*Number*	*Number*	*Number*	*Number*
Fishermen:						
On vessels	433		4,081	228	400	5,142
On boats and shore:						
Regular	3,617	62	2,612	738	258	7,287
Casual	1,379	23	1,805	254	582	4,043
Total	5,429	85	8,498	1,220	1,240	16,472
Vessels:						
Steam	1		14		9	24
Net tonnage	18		2,106		1,864	3,988
Motor	79		366	80	69	594
Net tonnage	904		14,164	951	965	16,984
Sail	1		1			2
Net tonnage	47		6			53
Total vessels	81		381	80	78	620
Total net tonnage	969		16,276	951	2,829	21,025
Boats:						
Motor	2,225	50	1,643	448	238	4,604
Other	1,364	10	1,623	483	311	3,791
Accessory boats	160		962	48	42	1,212
Apparatus:						
Purse seines:						
Mackerel	10		110	1	4	125
Length, yards	3,284		53,720	240	730	57,974
Other	49		2	3		54
Length, yards	8,300		260	330		8,890
Haul seines	29	1	18	8	28	84
Length, yards	3,120	45	2,960	845	3,482	10,452
Gill nets:						
Anchor	1,611	2	1,038		2	2,653
Square yards	382,605	360	395,430		2,040	780,435
Drift	100		8,120	180	50	8,400
Square yards	33,540		2,761,984	52,180	15,250	2,862,954
Runaround			1	6		7
Square yards			1,800	2,700		4,500
Stake					21	21
Square yards					2,760	2,760
Lines:						
Hand	3,443	90	568	348	332	4,781
Hooks	3,949	92	858	508	350	5,757
Trawl	24,600	360	54,271	1,116	841	81,188
Hooks	1,231,000	18,000	2,414,226	52,040	37,800	3,753,066
Pound nets	4		122	51	14	191
Floating traps	19		19	56		94
Weirs	226		6			232
Fyke nets	48		28	170	103	349
Dip nets	134		109	14	23	280
Bag nets	106					106
Push nets			111			111
Pocket nets	2					2
Otter trawls	33		306	76	108	523
Yards at mouth	857		9,013	2,079	3,331	15,280
Box traps	2		3			5
Pots:						
Crab	1,793		1,546		12	3,351
Eel	490		1,590	1,717	1,339	5,136
Lobster	205,217	4,120	73,440	42,085	16,733	341,595
Periwinkle or cockle			975	1,630		2,605
Harpoons	55	2	129	67	28	281
Spears	23		262	43	56	384
Dredges:						
Clam			67	12		79
Yards at mouth			36	8		44
Oyster			30	36	48	114
Yards at mouth			35	54	76	165
Scallop	105		3,218	624	2	3,949
Yards at mouth	167		2,231	521	7	2,926
Tongs			171	403	166	740
Rakes			657	45	104	806
Forks			925	26		951
Hoes	1,596		251	2	95	1,944

Fisheries of the New England States, 1932—Continued

CATCH: BY STATES

Species	Maine		New Hampshire		Massachusetts		Rhode Island		Connecticut		Total	
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives	2,296,287	$9,145	19,800	$200	1,164,283	$8,412	72,470	$761	19,339	$221	3,572,179	$18,739
Amberjack					975	39					975	39
Bluefish	1,414	55			226,003	16,209	134,275	11,173	285,993	24,559	647,685	51,996
Bonito					33,728	1,633	10,747	468	47	3	44,522	2,104
Butterfish	146,568	4,235			1,452,184	68,454	646,039	25,980	17,506	1,243	2,262,297	99,912
Carp									41,430	3,452	41,430	3,452
Catfish and bullheads									1,600	32	1,600	32
Cod	12,105,284	231,660	54,848	1,453	71,479,827	1,421,807	722,107	24,433	1,913,545	45,904	86,275,611	1,725,257
Croaker					468,884	10,427					468,884	10,427
Cunners							76,000	2,170			76,000	2,170
Cusk	1,029,147	13,081	394	8	4,035,540	51,432			107,702	2,303	5,172,783	66,824
Drum, black					51	1					51	1
Eels	131,455	11,515			438,205	16,880	195,749	12,499	196,013	15,888	961,422	56,782
Flounders	866,669	21,905	126	5	23,313,097	802,265	4,761,587	117,229	8,547,525	187,578	37,489,004	1,128,982
Goosefish									2,332	23	2,332	23
Grayfish					24,149	345	2,900	29			27,049	374
Haddock	9,798,746	266,018	205,046	7,242	136,386,573	3,006,689	257,133	7,761	3,820,864	112,366	150,468,362	3,400,076
Hake	6,171,696	55,619	202,045	3,109	10,366,864	146,495	19,990	249	181,135	3,150	16,941,640	208,622
Halibut	70,220	9,035			2,316,420	244,011			30,005	3,657	2,416,645	256,703
Herring, sea	31,988,132	99,083			5,687,254	50,277	399,066	7,302			38,074,452	156,662
Herring smelt					3,600	169					3,600	169
Hogfish					2,998	37					2,998	37
King whiting or "kingfish"	466	17			5,991	182	488	29			6,945	228
Launce					24,000	480					24,000	480
Mackerel	7,661,060	96,713	2,600	104	51,527,569	850,043	777,361	12,873	119,553	2,627	60,088,143	962,360
Menhaden					46,802	467	1,512	38	5,320	203	53,634	708
Minnows					125	25			5,400	186	5,525	211
Mummichog									4,250	43	4,250	43
Pollock	1,997,478	12,220	29,686	451	8,285,290	85,913	42,946	474	279,609	4,179	10,635,009	103,237
Rosefish	1,995	20			117,575	1,396			5,159	134	124,729	1,550
Salmon	36,125	8,566									36,125	8,566
Scup or porgy	10,100	52			2,426,516	61,983	1,957,919	49,333	63,207	2,530	4,457,742	113,908
Sea bass					3,419,394	84,026	62,742	2,586	124,834	7,985	3,606,970	94,597
Sea robin					5,050	51	81,002	954	30,378	241	116,430	1,246
Shad	107,891	1,699			46,198	2,125	7,502	471	70,525	8,463	232,116	12,758
Sharks	60,570	502			44,631	331	700	7	139,118	1,185	245,019	2,025
Skates					32,067	316	917,089	7,137			949,156	7,453
Smelt	270,327	36,546	1,850	353	1,800	252	240	36	3,124	312	277,341	37,499
Spot					22,200	222					22,200	222
Squeteagues or "sea trout":												
Gray	318	17			57,373	2,432	58,137	5,103	16,505	1,828	132,333	9,380
Spotted					2,328	216					2,328	216

Fisheries of the New England States, 1932—Continued

CATCH: BY STATES—Continued

Species	Maine		New Hampshire		Massachusetts		Rhode Island		Connecticut		Total	
FISH—continued	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Striped bass	537	$68			30,926	$5,389	6,811	$896	3,664	$563	41,938	$6,916
Sturgeon	2,122	267			5,810	451	200	20			8,132	738
Suckers	43,500	1,740							94,586	4,191	138,086	5,931
Swellfish	200	2									200	2
Swordfish	579,611	56,656			3,188,168	348,085	399,110	42,259	381,461	38,390	4,548,350	485,390
Tautog					159,117	6,132	210,008	8,314	76,709	4,095	445,834	18,541
Tilefish									249,207	10,576	249,207	10,576
Tomcod	50,514	892					3,460	52	2,250	225	56,224	1,169
Tuna or "horse mackerel"	78,517	2,998	3,264	$261	149,154	6,977	21,833	1,092	2,858	233	255,626	11,561
White perch					46,920	5,022	6,000	420	525	133	53,445	5,575
Whiting	2,486	25			6,376,948	49,389	792,215	11,563	29,399	248	7,201,048	61,225
Wolffish	85,836	970	4,232	63	1,796,840	26,720			46,042	906	1,932,950	28,659
Yellow perch	12	1			3,085	367	12,467	1,247	125	40	15,689	1,655
Total	75,595,283	941,332	523,891	13,249	335,222,512	7,384,574	12,657,715	354,958	16,918,844	489,895	440,918,245	9,184,008
SHELLFISH, ETC.												
Crabs:												
Hard	831,026	21,650			199,450	26,615	39,120	5,827	27,251	868	1,096,847	54,960
Soft									1,095	425	1,095	425
Lobsters	6,056,932	1,090,741	219,803	44,479	2,146,371	433,404	1,257,204	203,255	589,809	141,148	10,279,119	1,913,027
Shrimp					320	120					320	120
Squid	4,529	57			2,147,582	22,937	946,051	17,970	12,005	554	3,110,167	41,518
Clams:												
Cockle					50,022	5,767	187,626	10,022			237,648	15,789
Hard, public [1]	134,860	13,642			1,797,353	195,982	1,312,400	162,587	205,880	48,231	3,450,493	420,442
Hard, private [1]					8,250	1,750					8,250	1,750
Razor					403,744	17,254					403,744	17,254
Soft, public [1]	7,263,625	234,297			2,802,909	226,656	13,740	1,970	64,262	9,041	10,144,536	471,964
Surf or skimmer					55,390	3,525					55,390	3,525
Mussels, sea	33,690	1,404			29,700	3,000					63,390	4,404
Oysters: [1]												
Market, public, spring					5,250	1,600			24,179	3,358	29,429	4,958
Market, public, fall					1,312	300	1,300	250	11,475	1,200	14,087	1,750
Market, private, spring					118,824	43,817	951,375	176,381	1,155,078	153,086	2,225,277	373,284
Market, private, fall					154,184	49,791	3,037,801	518,744	1,925,654	253,800	5,117,639	822,335
Periwinkles	53,109	2,186			17,550	1,225			6,700	84	77,359	3,495
Scallops:												
Bay					1,405,498	362,068	131,859	39,436			1,537,357	401,504
Sea	607,780	96,239			869,634	88,555			94,527	8,928	1,571,941	193,722
Irish moss					83,500	4,175					83,500	4,175

Bloodworms	21,034	11,732			37,633	34,110					58,667	45,842
Sandworms					34,956	21,030					34,956	21,030
Turtles, loggerhead					1,425	15					1,425	15
Total	15,006,585	1,471,948	219,803	44,479	12,370,857	1,543,696	7,878,476	1,136,442	4,126,915	620,723	39,602,636	4,817,288
Grand total	90,601,868	2,413,280	743,694	57,728	347,593,369	8,928,270	20,536,191	1,491,400	21,045,759	1,110,618	480,520,881	14,001,296

[1] Statistics on hard clams used in this table are based on yields of 11 pounds of meats per bushel in Maine, Massachusetts, and Rhode Island and 10 pounds in Connecticut.

[2] Statistics on soft clams used in this table are based on yields of 15 pounds of meats per bushel in Maine; 16.09 pounds in Massachusetts; 15.61 pounds in Rhode Island; and 14 pounds in Connecticut.

[3] Statistics on oysters used in this table are based on yields of 6.56 pounds of meats per bushel in Massachusetts; 6.50 pounds in Rhode Island; and 6.75 pounds in Connecticut.

NOTE.—Of the total catch in Maine 27,100 pounds of fishery products, valued at $1,218, were taken in the southern winter trawl fishery off Maryland, Virginia, and North Carolina. Of the total catch in Massachusetts, 7,385,576 pounds of fishery products, valued at $204,542, were taken in the same fishery, while of the total catch in Connecticut, 191,494 pounds of fishery products, valued at $9,381, were taken in the same fishery. These products consisted principally of scup or porgy, sea bass, flounders, croaker, and gray squeteague.

Fisheries of the New England States, 1932—Continued

PRODUCTION OF CERTAIN SHELLFISH IN NUMBER AND BUSHELS

Product	Maine		Massachusetts		Rhode Island		Connecticut		Total	
	Quantity	*Value*	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
Crabs:										
Hard........number..	2,493,078	$21,650	598,350	$26,615	117,360	$5,827	81,753	$868	3,290,541	$54,960
Soft............do....	-------	-------	-------	-------	-------	-------	4,380	425	4,380	425
Clams:										
Cockle.......bushels..	-------	-------	2,779	5,767	10,424	10,022	-------	-------	13,203	15,789
Hard, public....do....	12,260	13,642	163,395	195,982	119,309	162,587	20,588	48,231	315,552	420,442
Hard, private...do....	-------	-------	750	1,750	-------	-------	-------	-------	750	1,750
Razor...........do....	-------	-------	12,617	17,254	-------	-------	-------	-------	12,617	17,254
Soft, public.....do....	484,242	234,297	174,202	226,656	880	1,970	4,590	9,041	663,914	471,964
Surf or skimmer.do....	-------	-------	3,077	3,525	-------	-------	-------	-------	3,077	3,525
Mussels, sea........do....	3,369	1,404	2,970	3,000	-------	-------	-------	-------	6,339	4,404
Oysters:										
Market, public, spring bushels..	-------	-------	800	1,600	-------	-------	3,582	3,358	4,382	4,958
Market, public, fall bushels..	-------	-------	200	300	200	250	1,700	1,200	2,100	1,750
Market, private, spring bushels..	-------	-------	18,114	43,817	146,365	176,381	171,123	153,086	335,602	373,284
Market, private, fall bushels..	-------	-------	23,504	49,791	467,354	518,744	285,282	253,800	776,140	822,335
Periwinkles.........do....	2,665	2,186	975	1,225	-------	-------	335	84	3,965	3,495
Scallops:										
Bay............do....	-------	-------	208,222	362,068	19,535	39,436	-------	-------	227,757	401,504
Sea.............do....	90,041	96,239	128,835	88,555	-------	-------	14,004	8,928	232,880	193,722

SEED OYSTER FISHERY

Item	Rhode Island		Connecticut		Total	
OPERATING UNITS						
	Number		*Number*		*Number*	
Fishermen:						
On vessels..................	-------		79		79	
On boats and shore:						
Regular..................	10		6		16	
Casual..................	-------		172		172	
Total..................	10		257		267	
Vessels:						
Steam..................	-------		4		4	
Net tonnage..................	-------		344		344	
Motor..................	-------		13		13	
Net tonnage..................	-------		140		140	
Sail..................	-------		3		3	
Net tonnage..................	-------		23		23	
Total vessels..................	-------		20		20	
Total net tonnage..................	-------		507		507	
Boats:						
Motor..................	-------		6		6	
Other..................	-------		112		112	
Apparatus:						
Dredges, oyster..................	-------		97		97	
Yards at mouth..................	-------		88		88	
Tongs..................	-------		129		129	
Rakes..................	10		41		51	
CATCH						
	Bushels	*Value*	*Bushels*	*Value*	*Bushels*	*Value*
Oysters:						
Seed, public, spring..................	-------	-------	29,164	$15,840	29,164	$15,840
Seed, public, fall..................	1,022	$307	42,450	19,593	43,472	19,900
Seed, private, spring..................	-------	-------	136,356	74,445	136,356	74,445
Seed, private, fall..................	-------	-------	20,200	9,600	20,200	9,600
Total..................	1,022	307	228,170	119,478	229,192	119,785

NOTE.—Of the number of persons fishing for seed oysters, 10 in Rhode Island, and 149 in Connecticut—a total of 159 are duplicated among those fishing for market oysters or other species. Similarly the following craft and gear are duplicated: 100 boats other than motor in Connecticut, 112 tongs, and all the rakes.

MAINE

Fisheries of Maine, 1932

OPERATING UNITS: BY GEAR

Item	Purse seines		Haul seines	Gill nets		Lines		Pound nets
	Mackerel	Other		Anchor	Drift	Hand	Trawl	
	Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Fishermen:								
On vessels	41	101		62	14	13	163	
On boats and shore:								
Regular	13	82	59	130		325	531	5
Casual				87	4	536	24	
Total	54	183	59	279	18	874	718	5
Vessels:								
Steam	1							
Net tonnage	18							
Motor	6	21		12	2	5	20	
Net tonnage	63	192		114	36	40	335	
Sail		1						
Net tonnage		47						
Total vessels	7	22		12	2	5	20	
Total net tonnage	81	239		114	36	40	335	
Boats:								
Motor	3	28	29	67	3	259	415	4
Other	3	28	23	53	1	8	11	
Accessory boats	6	17		3			119	
Apparatus:								
Number	10	49	29	1,611	100	3,443	24,600	4
Length, yards	3,284	8,300	3,120					
Square yards				382,605	33,540			
Hooks, baits or snoods						3,949	1,231,000	

Item	Floating traps	Weirs	Fyke nets	Dip nets	Bag nets	Pocket nets	Otter trawls	Box traps
	Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Fishermen:								
On vessels							41	
On boats and shore:								
Regular	23	124		7			44	
Casual	3	141	9	127	65	1		2
Total	26	265	9	134	65	1	85	2
Vessels:								
Motor							12	
Net tonnage							112	
Boats:								
Motor	12	71					21	
Other	5	164	9	4	15			
Apparatus:								
Number	19	226	48	134	106	2	33	2
Yards at mouth							857	

Fisheries of Maine, 1932—Continued

OPERATING UNITS: BY GEAR—Continued

Item	Pots			Harpoons	Spears	Dredges, scallop	Hoes	By hand	Total, exclusive of duplication
	Crab	Eel	Lobster						
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels			5	103		33			433
On boats and shore:									
Regular	44	5	2,572	77		105	1,113	18	3,617
Casual	11	19	47		23	17	507	36	1,379
Total	55	24	2,624	180	23	155	1,620	54	5,429
Vessels:									
Steam									1
Net tonnage									18
Motor			5	15		8			79
Net tonnage			28	312		95			904
Sail									1
Net tonnage									47
Total vessels			5	15		8			81
Total net tonnage			28	312		95			969
Boats:									
Motor	25	1	1,839	40		78	173		2,225
Other	27	23	665		23		677		1,364
Accessory boats				15					160
Apparatus:									
Number	1,793	490	205,217	55	23	105	1,596		
Yards at mouth						167			

CATCH: BY GEAR

Species	Purse seines				Haul seines		Gill nets			
	Mackerel		Other				Anchor		Drift	
	Lb.	*Value*	*Lb.*	*Value*	*Lb.*	*Value*	*Lb.*	*Value*	*Lb.*	*Value*
Alewives	508,527	$2,553	13,750	$69			78,640	$641	785	$8
Bluefish	1,159	35								
Butterfish	7,112	280	15,444	459					47	3
Cod	145	3					4,815,374	106,059		
Cusk							18,156	183		
Flounders							15,179	229		
Haddock							1,540,703	31,931		
Hake							447,538	4,275		
Halibut							69	10		
Herring, sea	949,712	4,661	14,901,561	46,711			76,893	274		
Mackerel	4,223,594	52,507	477,492	6,612			764,829	12,155	120,700	5,377
Pollock	16,994	87	50,982	260			852,187	4,690		
Salmon							3,638	732		
Shad	72,721	772	14,590	290			2,306	182	13	1
Sharks	2,470	20					49,549	403	2,304	17
Smelt					45,011	$4,920	30,264	4,676		
Sturgeon	513	40					809	91	800	136
Tomcod					3,714	38				
Wolffish							3,283	14		
Lobsters							162	41		
Total	5,782,947	60,958	15,473,819	54,401	48,725	4,958	8,699,579	166,586	124,649	5,542

Fisheries of Maine, 1932—Continued

CATCH: BY GEAR—Continued

Species	Lines				Pound nets		Floating traps		Weirs	
	Hand		Trawl							
	Lb.	*Value*	*Lb.*	*Value*	*Lb.*	*Value*	*Lb.*	*Value*	*Lb.*	*Value*
Alewives									557, 975	$2, 068
Bluefish							255	$20		
Butterfish					21, 019	$620	102, 472	2, 858		
Cod	2, 234, 500	$29, 920	4, 459, 169	$86, 631						
Cusk	12, 257	70	940, 787	12, 034						
Eels			10, 240	819						
Flounders	415	8	10, 591	190					8, 150	488
Haddock	1, 212, 852	26, 829	5, 824, 061	172, 815						
Hake	1, 489, 216	9, 560	3, 930, 737	39, 101						
Halibut	8, 864	1, 030	57, 623	7, 478						
Herring, sea					50, 253	629	149, 544	1, 870	15, 860, 169	44, 938
Mackerel					155, 392	1, 741	916, 568	9, 667	1, 002, 485	8, 654
Pollock	690, 149	4, 596	330, 159	2, 294			56, 640	290		
Rosefish			638	6						
Salmon					268	54	6, 101	1, 337	25, 518	6, 323
Shad					3, 828	124	1, 679	54	12, 754	276
Sharks	6, 000	60								
Smelt	108, 212	15, 479					3, 940	411	4, 337	680
Striped bass									537	68
Whiting					2, 486	25				
Wolffish			79, 818	940						
Squid					4, 474	56				
Total	5, 762, 465	87, 552	15, 643, 818	322, 308	237, 720	3, 249	1, 237, 199	16, 507	17, 471, 925	63, 495

Species	Fyke nets		Dip nets		Bag nets		Pocket nets		Otter trawls	
	Lb.	*Value*	*Lb.*	*Value*	*Lb.*	*Value*	*Lb.*	*Value*	*Lb.*	*Value*
Alewives			1, 136, 610	$3, 806						
Butterfish									474	$15
Cod									596, 096	9, 047
Cusk									57, 947	794
Eels	2, 516	$202								
Flounders									832, 334	20, 990
Haddock									1, 221, 130	34, 443
Hake									304, 205	2, 683
Halibut									3, 664	517
King whiting or "kingfish"									466	17
Pollock									367	3
Rosefish									1, 362	14
Salmon			600	120						
Scup or porgy									10, 100	62
Sharks									247	2
Smelt			16, 280	2, 706	61, 283	$7, 554	1, 000	$120		
Squeteague or "sea trout", gray									318	17
Suckers	43, 500	1, 740								
Swellfish									200	2
Tomcod	26, 800	804			20, 000	50				
Wolffish									2, 735	16
Yellow perch	12	1								
Squid									55	1
Total	72, 828	2, 747	1, 153, 490	6, 632	81, 283	7, 604	1, 000	120	3, 031, 700	68, 623

Species	Box traps		Pots						Harpoons	
			Crab		Eel		Lobster			
	Lb.	*Value*	*Lb.*	*Value*	*Lb.*	*Value*	*Lb.*	*Value*	*Lb.*	*Value*
Eels	9, 200	$816			67, 014	$5, 369				
Swordfish									579, 611	$56, 656
Tuna or "horse mackerel"									78, 517	2, 998
Crabs, hard			614, 022	$15, 139			217, 004	$6, 511		
Lobsters			9, 936	2, 530			6, 046, 834	1, 088, 170		
Total	9, 200	816	623, 958	17, 669	67, 014	5, 369	6, 263, 838	1, 094, 681	658, 128	59, 654

Fisheries of Maine, 1932—Continued

CATCH: BY GEAR—Continued

Species	Spears		Dredges, scallop		Hoes		By hand	
	Lb.	*Value*	*Lb.*	*Value*	*Lb.*	*Value*	*Lb.*	*Value*
Eels	42,485	$4,309						
Clams:								
Hard, public					134,860	$13,642		
Soft, public					7,263,625	234,297		
Mussels							33,690	$1,404
Periwinkles							53,109	2,186
Scallops, sea			607,780	$96,239				
Bloodworms					21,034	11,732		
Total	42,485	4,309	607,780	96,239	7,419,519	259,671	86,799	3,590

NEW HAMPSHIRE

Fisheries of New Hampshire, 1932 [1]

OPERATING UNITS: BY GEAR

Item	Haul seines	Gill nets, anchor	Lines		Pots, lobster	Harpoons	Total, exclusive of duplication
			Hand	Trawl			
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On boats and shore.							
Regular	2	2		11	57	4	62
Casual			23				23
Total	2	2	23	11	57	4	85
Boats:							
Motor	1	1	1	8	47	2	50
Other	1				9		10
Apparatus:							
Number	1	2	90	360	4,120	2	
Length, yards	45						
Square yards		360					
Hooks			92	18,000			

CATCH: BY GEAR

Species	Haul seines		Gill nets, anchor		Lines: Hand		Lines: Trawl		Pots, lobster		Harpoons	
	Lb.	*Value*	*Lb.*	*Value*	*Lb.*	*Value*	*Lb.*	*Value*	*Lb.*	*Value*	*Lb.*	*Value*
Alewives	19,800	$200										
Cod					3,800	$162	51,048	$1,291				
Cusk							394	8				
Flounders							126	5				
Haddock							205,046	7,242				
Hake							202,045	3,109				
Mackerel			2,600	$104								
Pollock					1,500	300	29,686	451				
Smelt	350	53										
Tuna or "horse mackerel"											3,264	$261
Wolffish							4,232	63				
Lobsters									219,803	$44,479		
Total	20,150	253	2,600	104	5,300	462	492,577	12,169	219,803	44,479	3,264	261

[1] The fisheries of New Hampshire are confined to Rockingham County.

MASSACHUSETTS

Fisheries of Massachusetts, 1932

OPERATING UNITS: BY GEAR

Item	Purse seines		Haul seines	Gill nets			Lines		Pound nets	Floating traps
	Mackerel	Other		Anchor	Drift	Runaround	Hand	Trawl		
	No.	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*
Fishermen:										
On vessels	1,121			169	490	4	163	1,229		
On boats and shore—										
Regular	59		49	8	178		224	579	184	44
Casual	11	6	9		8		48	4		
Total	1,191	6	58	177	676	4	435	1,812	184	44
Vessels:										
Motor	97			19	64	1	17	75		
Net tonnage	3,315			362	1,489	5	420	3,822		
Sail							1			
Net tonnage							6			
Total vessels	97			19	64	1	18	75		
Total net tonnage	3,315			362	1,489	5	426	3,822		
Boats:										
Motor	122	2	6	4	86		179	218	49	18
Other	12	4	28		70		58	70	85	26
Accessory boats	52			17	71	2	13	578		
Apparatus:										
Number	110	2	18	1,038	8,120	1	568	54,271	122	19
Length, yards	53,720	260	2,960							
Square yards				395,430	2,761,984	1,800				
Hooks, baits, or snoods							858	2,414,226		

Item	Weirs	Fyke nets	Dip nets	Push nets	Otter trawls	Box traps	Pots			
							Crab	Eel	Lobster	Periwinkle or cockle
	No.	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*
Fishermen:										
On vessels					1,996				6	
On boats and shore—										
Regular	8	13	124	23	149	3	33	41	566	20
Casual		8	41	88				9	398	
Total	8	21	165	111	2,145	3	33	50	970	20
Vessels:										
Steam					14					
Net tonnage					2,106					
Motor					222				3	
Net tonnage					8,891				25	
Total vessels					236				3	
Total net tonnage					10,997				25	
Boats:										
Motor	2		24		70		23	28	696	11
Other	4	10	87	70				24	282	8
Accessory boats					96					
Apparatus:										
Number	6	28	109	111	306	3	1,546	1,590	73,440	975
Yards at mouth					9,013					

Fisheries of Massachusetts, 1932—Continued

OPERATING UNITS: BY GEAR—Continued

Item	Harpoons	Spears	Dredges: Clam	Dredges: Oyster	Dredges: Scallop	Tongs	Rakes	Forks	Hoes	By hand	Total, exclusive of duplication
	No.	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*
Fishermen:											
On vessels	701	------	18	9	89	------	------	------	------	------	4,081
On boats and shore—											
Regular	88	120	106	24	517	140	406	470	185	24	2,612
Casual	7	142	------	------	579	31	251	455	66	15	1,805
Total	796	262	124	33	1,185	171	657	925	251	39	8,498
Vessels:											
Steam	------	------	------	------	------	------	------	------	------	------	14
Net tonnage	------	------	------	------	------	------	------	------	------	------	2,106
Motor	91	------	8	3	20	------	------	------	------	------	366
Net tonnage	3,210	------	86	35	247	------	------	------	------	------	14,164
Sail	------	------	------	------	------	------	------	------	------	------	1
Net tonnage	------	------	------	------	------	------	------	------	------	------	6
Total vessels	91	------	8	3	20	------	------	------	------	------	381
Total net tonnage	3,210	------	86	35	247	------	------	------	------	------	16,276
Boats:											
Motor	137	------	59	12	648	34	49	65	------	------	1,643
Other	46	145	------	------	10	141	577	290	95	------	1,623
Accessory boats	133	------	------	------	------	------	------	------	------	------	962
Apparatus:											
Number	129	262	67	30	3,218	171	657	925	251	------	------
Yards at mouth	------	------	36	35	2,231	------	------	------	------	------	------

CATCH: BY GEAR

Species	Purse seines: Mackerel		Purse seines: Other		Haul seines		Gill nets: Anchor	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives	126,200	$843	------	------	313,800	$2,455	5,600	$28
Bluefish	------	------	------	------	5,500	550	------	------
Butterfish	5,950	296	------	------	------	------	2,669,691	78,659
Cod	72	1	------	------	------	------	470	3
Cusk	------	------	------	------	------	------	------	------
Eels	------	------	------	------	100,000	2,000	840	14
Flounders	------	------	------	------	------	------	1,156,411	24,857
Haddock	------	------	------	------	------	------	800,567	5,817
Hake	------	------	------	------	------	------	74	6
Halibut	------	------	------	------	------	------	------	------
Herring, sea	7,200	46	------	------	3,500	53	------	------
Launce	------	------	24,000	$480	------	------	7,750	232
Mackerel	41,167,984	669,181	------	------	19,250	578	961,978	6,988
Pollock	440	1	------	------	------	------	------	------
Shad	1,340	28	------	------	22,600	1,130	2,132	14
Sharks	1,104	11	------	------	------	------	------	------
Striped bass	------	------	------	------	15,500	2,325	------	------
Tuna or "horse mackerel"	2,775	128	------	------	------	------	------	------
White perch	------	------	------	------	45,450	4,798	------	------
Whiting	75	2	------	------	------	------	------	------
Yellow perch	------	------	------	------	3,000	360	------	------
Total	41,313,140	670,537	24,000	480	528,600	14,249	5,605,513	116,618

Fisheries of Massachusetts, 1932—Continued

CATCH: BY GEAR—Continued

Species	Gill nets—Continued				Lines			
	Drift		Runaround		Hand		Trawl	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives	400	$3						
Bluefish	21,650	2,363	20,000	$1,600	139,100	$8,234		
Bonito					200	6		
Butterfish	1,455	92			9,500	950	2,631	$189
Cod	441,024	13,710			1,686,707	33,437	28,652,506	552,298
Cusk					27,255	369	3,441,296	43,238
Eels					10,760	646	63,175	716
Flounders	5,500	165			20,600	900	491,033	18,962
Grayfish	4,250	85						
Haddock	77,809	1,904			199,879	5,068	28,356,066	700,863
Hake	119,922	832			28,333	347	5,294,993	72,248
Halibut					46,855	4,586	1,764,535	178,489
Herring, sea	4,200	52						
Mackerel	3,703,091	98,111			75,000	2,250	2,835	76
Pollock	63,910	678			123,846	1,313	1,570,756	14,725
Rosefish							11,850	232
Scup or porgy					264,500	6,321		
Sea bass			500	60	75,350	3,152		
Shad	35	1						
Sharks	330	13						
Skates							11,200	112
Smelt					1,800	252		
Striped bass					3,000	360		
Swordfish					162	34	5,465	529
Tautog					129,160	5,060		
White perch	1,200	216						
Wolffish					18,830	452	373,397	5,069
Total	4.444.836	118.285	20.500	1,660	2,860,837	73,737	70,041,788	1,587,746

Species	Pound nets		Floating traps		Weirs		Fyke nets	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives	52,750	$337	48,200	$392				
Amberjack	975	39						
Bluefish	20,514	1,649	935	86	15,000	$1,500		
Bonito	29,883	1,433	200	10	3,175	157		
Butterfish	1,041,491	48,819	226,066	8,574	27,785	1,153		
Cod	4,518	107	23,727	454	1,732	47		
Eels	15,516	777					17,200	$1,182
Flounders	26,634	935						
Grayfish	17,834	236			1,200	14		
Hake			4,512	57				
Herring, sea	2,380,574	17,052	342,705	3,329	24,575	185		
Mackerel	4,173,724	51,761	1,389,245	16,807	893,745	7,328		
Menhaden	2,156	21	44,646	446				
Pollock	87,913	800	68,023	397				
Scup or porgy	104,742	3,239						
Sea bass	15,599	1,401						
Sea robin	5,050	51						
Shad	15,638	741	1,275	64				
Sharks	25,968	118	270	5				
Skates	4,497	46						
Squeteagues or "sea trout":								
Gray	157	16						
Spotted	2,328	216						
Striped bass	276	36	50	3	1,600	180		
Swordfish	228	27						
Tautog	29,162	1,037	480	24	175	7		
Tuna or "horse mackerel"	124,637	5,893	200	14	9,965	519		
Whiting	4,577,772	34,359	1,079,386	6,729	587,850	4,409		
Yellow perch	85	7						
Squid	1,978,189	20,440	48,025	829	74,995	868		
Turtles, loggerhead	1,425	15						
Total	14,740,235	191,608	3,277,945	38,220	1,041,797	16,367	17,200	1,182

Fisheries of Massachusetts, 1932—Continued

CATCH: BY GEAR—Continued

Species	Dip nets		Push nets		Otter trawls		Box traps	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives	447,100	$3,320			78,233	$574	92,000	$460
Bluefish					3,304	227		
Bonito					270	27		
Butterfish					137,306	8,381		
Cod					37,999,790	743,094		
Croaker					468,884	10,427		
Cusk					566,519	7,822		
Drum, black					51	1		
Eels					82,529	2,938		
Flounders					22,768,490	781,289		
Grayfish					865	10		
Haddock					106,596,348	2,273,937		
Hake					4,118,537	67,194		
Halibut					504,956	60,930		
Herring, sea	2,870,000	29,150			54,500	410		
Herring smelt					3,600	169		
Hogfish					2,998	37		
King whiting or "kingfish"					5,991	182		
Mackerel	67,500	1,800			27,445	1,919		
Minnows	125	25						
Pollock					5,408,424	61,011		
Rosefish					105,725	1,104		
Scup or porgy					2,057,274	52,423		
Sea bass					3,327,945	79,413		
Shad					5,310	161		
Sharks					12,907	138		
Skates					16,070	146		
Spot					22,200	222		
Squeteagues or "sea trout", gray					57,216	2,416		
Striped bass	10,500	2,485						
Sturgeon					5,810	451		
Swordfish					1,212	110		
Tautog					140	4		
Tuna or "horse mackerel"					10,650	312		
White perch					270	8		
Whiting					131,865	3,890		
Wolffish					1,404,613	21,199		
Shrimp	320	120						
Scallops, bay			66,528	$16,587				
Squid					46,373	800		
Total	3,395,545	36,900	66,528	16,587	186,034,620	4,183,436	92,000	460

Species	Pots							
	Crab		Eel		Lobster		Periwinkle or cockle	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Eels			88,075	$4,980				
Crabs, hard	134,837	$18,069			64,613	$8,546		
Lobsters					2,146,371	433,404		
Clams, cockle							46,062	$5,382
Periwinkles							17,550	1,225
Total	134,837	18,069	88,075	4,980	2,210,984	441,950	63,612	6,607

Species	Harpoons		Spears		Dredges			
					Clam		Oyster	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Eels			60,950	$3,641				
Sharks	1,920	$32						
Skates	300	12						
Swordfish	3,181,111	347,385						
Tuna or "horse mackerel"	927	111						
Clams:								
Hard, public					533,185	$55,219		
Surf or skimmer					2,250	250		
Mussels, sea					29,700	3,000		
Oysters:								
Market, private, spring							69,285	$24,188
Market, private, fall							68,511	19,446
Total	3,184,258	347,540	60,950	3,641	565,135	58,469	137,796	43,634

Fisheries of Massachusetts, 1932—Continued

CATCH: BY GEAR—Continued

Species	Dredges—Continued: Scallop		Tongs		Rakes	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Clams:						
Hard, public			363,501	$40,240	900,667	$100,523
Hard, private			8,250	1,750		
Surf or skimmer	1,800	$100				
Oysters:						
Market, public, spring			5,250	1,600		
Market, public, fall			1,312	300		
Market, private, spring			49,539	19,629		
Market, private, fall			85,673	30,345		
Scallops:						
Bay	1,324,570	341,506			4,500	1,500
Sea	869,634	88,555				
Irish moss					83,500	4,175
Total	2,196,004	430,161	513,525	93,864	988,667	106,198

Species	Forks		Hoes		By hand	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Clams:						
Cockle					3,960	$385
Razor	59,200	$1,850	344,544	$15,404		
Soft, public	2,590,084	207,426	212,825	19,230		
Surf or skimmer	40,800	2,400			10,540	775
Scallops, bay					9,900	2,475
Bloodworms	37,633	34,110				
Sandworms	34,956	21,030				
Total	2,762,673	266,816	557,369	34,634	24,400	3,635

RHODE ISLAND

Fisheries of Rhode Island, 1932

OPERATING UNITS: BY GEAR

Item	Purse seines: Mackerel	Purse seines: Other	Haul seines	Gill nets: Drift	Gill nets: Run-around	Lines: Hand	Lines: Trawl	Pound nets	Floating traps
	Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Fishermen:									
On vessels	8			8		39	10		
On boats and shore:									
Regular		15	15	8	12	162	31	43	144
Casual			4			7			
Total	3	15	19	16	12	208	41	43	144
Vessels:									
Motor	1			3		19	4		
Net tonnage	7			30		134	26		
Boats:									
Motor		3		4	3	105	18	15	24
Other		6	10	4	5	20	2	35	56
Accessory boats				2		4			
Apparatus:									
Number	1	3	8	130	6	348	1,116	51	56
Length, yards	240	330	845						
Square yards				52,180	2,700				
Hooks, baits, or snoods						508	52,040		

Fisheries of Rhode Island, 1932—Continued

OPERATING UNITS: BY GEAR—Continued

Item	Fyke nets	Dip nets	Otter trawls	Pots			Harpoons	Spears
				Eel	Lobster	Periwinkle or cockle		
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels			109		32		97	
On boats and shore:								
Regular	13	14	58	30	296	27	53	21
Casual	1			6	42	1		22
Total	14	14	167	36	370	28	150	43
Vessels:								
Motor			43		15		33	
Net tonnage			383		103		267	
Boats:								
Motor	10	12	33	26	253	25	30	
Other	2			8	38		30	3
Accessory boats			7				35	
Apparatus:								
Number	170	14	76	1, 717	42, 085	1, 630	67	43
Yards at mouth			2, 079					

Item	Dredges			Tongs	Rakes	Forks	Hoes	Total, exclusive of duplication
	Clam	Oyster	Scallop					
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels	5	69						228
On boats and shore:								
Regular	26		152	248	35	10	1	738
Casual			22	158	9	16	1	254
Total	31	69	174	406	44	26	2	1, 220
Vessels:								
Motor	2	18						80
Net tonnage	18	425						951
Boats:								
Motor	10		132	97	8			448
Other				310	34		2	483
Accessory boats								48
Apparatus:								
Number	12	36	624	403	45	26	2	
Yards at mouth	8	54	521					

CATCH: BY GEAR

Species	Purse seines				Haul seines		Gill nets	
	Mackerel		Other				Drift	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Bluefish					6, 500	$715	13, 750	$1, 180
Eels					19, 800	1, 353		
Herring, sea			105, 000	$1, 400	20, 000	200		
Mackerel	45, 000	$675					38, 000	710
Squeteagues or "sea trout", gray					3, 500	350		
Striped bass					800	144		
Tautog					1, 500	75		
Total	45, 000	675	105, 000	1, 400	52, 100	2, 837	51, 750	1, 890

Fisheries of Rhode Island, 1932—Continued

CATCH: BY GEAR—Continued

Species	Gill nets—Con.		Lines				Pound nets	
	Runaround		Hand		Trawl			
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives							25,710	$327
Bluefish	24,000	$2,450	26,500	$2,695			6,000	500
Butterfish							154,383	6,279
Cod			461,411	14,978	151,855	$6,594	1,100	30
Eels			12,950	906			41,718	2,571
Flounders					1,600	72	29,488	1,612
Grayfish							500	5
Haddock			6,930	252	129,354	4,669		
Hake			4,440	44	1,200	28		
Herring, sea							113,506	1,512
Mackerel			5,600	168			99,077	2,180
Menhaden							100	5
Pollock			11,220	130				
Scup or porgy							8,500	255
Sea bass			200	12				
Sea robin							2,000	20
Shad							3,655	316
Sharks							500	5
Skates			2,500	25	3,500	43		
Smelt							240	36
Squeteagues or "sea trout", gray			500	40			20,612	2,009
Striped bass							4,486	569
Tautog			103,700	4,138			55,868	2,468
Tomcod							3,460	52
Tuna or "horse mackerel"			19,800	990				
White perch							4,500	360
Whiting							51,274	634
Yellow perch							12,467	1,247
Squid							138,476	2,148
Total	24,500	2,450	655,751	24,378	287,509	11,406	777,620	25,140

Species	Floating traps		Fyke nets		Dip nets		Otter trawls	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives	46,700	$434						
Bluefish	57,025	3,633						
Bonito	10,747	468						
Butterfish	491,656	19,701						
Cod	41,946	1,145					65,795	$1,686
Cunners	1,000	20			75,000	$2,150		
Eels	571	28	13,000	$860			9,000	540
Flounders	336,549	10,229	36,600	1,312			4,357,350	104,004
Grayfish	2,400	24						
Haddock	1,189	32					119,660	2,808
Hake	14,260	177						
Herring, sea	115,335	1,400					45,225	2,790
King whiting or "kingfish"	488	29						
Mackerel	589,684	9,140						
Menhaden	1,412	33						
Pollock	30,626	324					1,100	20
Scup or porgy	1,949,419	49,078						
Sea bass	62,542	2,574						
Sea robin	79,002	934						
Shad	3,847	155						
Sharks	200	2						
Skates	8,220	82					902,860	6,987
Squeteagues or "sea trout", gray	33,525	2,704						
Striped bass	1,525	183						
Sturgeon	200	20						
Tautog	36,240	1,315	12,700	318				
Tuna or "horse mackerel"	2,033	102						
White perch	1,500	60						
Whiting	536,366	5,358					204,575	5,571
Squid	806,375	15,780					1,200	36
Total	5,262,651	125,170	62,300	2,490	75,000	2,150	5,706,765	124,442

Fisheries of Rhode Island, 1932—Continued

CATCH: BY GEAR—Continued

Species	Pots						Harpoons	
	Eel		Lobster		Periwinkle or cockle			
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Eels	81,150	$5,071						
Swordfish							399,110	$42,259
Crabs, hard			39,120	$5,827				
Lobsters			1,257,204	203,255				
Clams, cockle			33,300	1,715	154,326	$8,307		
Total	81,150	5,071	1,329,624	210,797	154,326	8,307	399,110	42,259

Species	Spears		Dredges					
			Clams		Oyster		Scallop	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Eels	17,560	$1,170						
Clams, hard, public			322,400	$38,858				
Oysters:								
Market, private, spring					951,375	$176,381		
Market, private, fall					3,036,501	518,494		
Scallops, bay							131,859	$39,436
Total	17,560	1,170	322,400	38,858	3,987,876	694,875	131,859	39,436

Species	Tongs		Rakes		Forks		Hoes	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Clams:								
Hard, public	892,925	$111,339	97,075	$12,390				
Soft, public					11,020	$1,690	2,720	$280
Oysters:								
Market, public, fall	1,300	250						
Market, private, fall	1,300	250						
Total	895,525	111,839	97,075	12,390	11,020	1,690	2,720	280

SEED OYSTER FISHERY: BY GEAR

Operating units	Rakes
Fishermen, on boats and shore:	*Number*
Regular	10
Apparatus:	
Number	10

Catch	Bushels	Value
Oysters, seed, public, fall	1,022	$307

NOTE.—Of the persons and gear employed in the seed oyster fishery all are duplicated among those in the market oyster fishery or fisheries for other species.

CONNECTICUT

Fisheries of Connecticut, 1932

OPERATING UNITS: BY GEAR

Item	Purse seines, mackerel	Haul seines	Gill nets			Lines		Pound nets
			Anchor	Drift	Stake	Hand	Trawl	
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels	7					31	28	
On boats and shore:								
Regular	6	5	2	1		114	7	17
Casual		104		69	10	33		
Total	13	109	2	70	10	178	35	17
Motor	2					9	2	
Net tonnage	21					118	71	
Boats:								
Motor	2	1	2	37		93	3	9
Other	2	34		10	8		1	5
Accessory boats						5	19	
Apparatus:								
Number	4	28	2	50	21	332	841	14
Length, yards	730	3,482						
Square yards			2,040	15,250	2,760			
Hooks, baits, or snoods						350	37,800	

Item	Fyke nets	Dip nets	Otter trawls	Pots			Harpoons
				Crab	Eel	Lobster	
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels			216			8	73
On boats and shore:							
Regular	1	2	107		6	170	17
Casual	24	21		1	45	25	6
Total	25	23	323	1	51	203	96
Vessels:							
Steam			5				
Net tonnage			963				
Motor			45			4	18
Net tonnage			548			30	272
Total vessels			50			4	18
Total net tonnage			1,511			30	272
Boats:							
Motor			58		1	151	10
Other	16	16		1	49	17	3
Accessory boats			1				17
Apparatus:							
Number	103	23	108	12	1,339	16,773	28
Yards at mouth			3,331				

Item	Spears	Dredges		Tongs	Rakes	Hoes	Total, exclusive of duplication
		Oyster	Scallop				
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels		130	8				400
On boats and shore:							
Regular	6			13	4	11	258
Casual	50			153	100	84	582
Total	56	130	8	166	104	95	1,240
Vessels:							
Steam		4					9
Net tonnage		901					1,864
Motor		17	1				69
Net tonnage		300	55				965
Total vessels		21	1				78
Total net tonnage		1,201	55				2,829
Boats:							
Motor				2		2	238
Other	39			110	37	49	311
Accessory boats							42
Apparatus:							
Number	56	48	2	166	104	95	
Yards at mouth		76	7				

Fisheries of Connecticut, 1932—Continued

CATCH: BY GEAR

Species	Purse seines, mackerel		Haul seines		Gill nets					
					Anchor		Drift		Stake	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives			9,500	$95						
Bluefish					2,000	$260				
Carp			25,658	2,160					10,272	$767
Mackerel	115,020	$2,260								
Minnows			4,900	161						
Mummichog			4,250	43						
Shad			29,652	2,940			40,180	$5,454		
Smelt			3,124	312						
Squeteagues, or "sea trout", gray					848	77				
Striped bass					1,500	300				
Suckers			60,235	2,526						
Tomcod			626	63						
Total	115,020	2,260	137,945	8,300	4,348	637	40,180	5,454	10,272	767

Species	Lines				Pound nets		Fyke nets	
	Hand		Trawl					
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives					1,876	$28	7,963	$98
Bluefish	274,556	$23,436			9,179	846		
Bonito	47	3						
Butterfish					15,406	1,138		
Carp							5,500	525
Catfish and bullheads							1,600	32
Cod	61,273	1,180	369,968	$6,698				
Cusk			13,408	150				
Eels			3,979	205	1,949	237	7,942	759
Flounders					13,585	1,062		
Haddock			454,887	8,215				
Hake			67,260	507				
Halibut			8,000	300				
Mackerel					4,533	367		
Menhaden					5,320	203		
Pollock	12,600	504	33,407	150				
Scup or porgy					200	40		
Sea bass	24,196	1,734						
Sharks			230	2	1,750	13		
Squeteagues, or "sea trout", gray	537	56			14,260	1,623	500	60
Striped bass	1,200	120			964	143		
Suckers							34,351	1,665
Tautog	49,630	2,793			4,228	235		
Tilefish			249,207	10,576				
Tuna or "horse mackerel"	58	2						
White perch							525	133
Yellow perch							125	40
Squid					8,865	521		
Total	424,097	29,828	1,200,346	26,803	82,115	6,456	58,506	3,302

Fisheries of Connecticut—Continued

CATCH: BY GEAR—Continued

Species	Dip nets		Otter trawls		Pots—Crab		Pots—Eel	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Bluefish			258	$17				
Butterfish			2,100	105				
Cod			1,482,304	38,026				
Cusk			94,294	2,153				
Eels			660	14			92,367	$8,700
Flounders			8,533,940	186,516				
Goosefish			2,332	23				
Haddock			3,365,977	104,151				
Hake			113,875	2,643				
Halibut			22,005	3,357				
Minnows	500	$25						
Pollock			233,602	3,525				
Rosefish			5,159	134				
Scup or porgy			63,007	2,490				
Sea bass			100,638	6,251				
Sea robin			30,378	241				
Shad	693	69						
Sharks			137,138	1,170				
Squeteagues, or "sea trout", gray			360	22				
Tautog			14,319	470				
Tomcod							1,624	162
Whiting			29,399	248				
Wolffish			46,042	906				
Crabs:								
Hard	8,181	482			428	$13		
Soft	1,095	425						
Lobsters			85	17				
Squid			3,140	33				
Total	10,469	1,001	14,281,012	352,512	428	13	93,991	8,862

Species	Pots—Con. Lobster		Harpoons		Spears		Dredges—Oyster		Dredges—Scallop	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Eels					89,116	$5,973				
Swordfish			381,461	$38,390						
Tautog	8,532	$597								
Tuna or "horse mackerel"			2,800	231						
Crabs, hard	18,642	373								
Lobsters	598,724	141,131								
Oysters:										
Market, private, spring							1,149,678	$151,961		
Market, private, fall							1,917,554	252,300		
Periwinkles	6,700	84								
Scallops, sea									94,527	$8,928
Total	632,598	142,185	384,261	38,621	89,116	5,973	3,067,232	404,261	94,527	8,928

Species	Tongs		Rakes		Hoes	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Clams:						
Hard, public	93,030	$20,106	98,760	$25,098	14,090	$3,027
Soft, public					64,262	9,041
Oysters:						
Market, public, spring	23,166	3,058	1,013	300		
Market, public, fall	11,475	1,200				
Market, private, spring	5,400	1,125				
Market, private, fall	8,100	1,500				
Total	141,171	26,989	99,773	25,398	78,352	12,068

Fisheries of Connecticut—Continued

SEED OYSTER FISHERY: BY GEAR

Item	Oyster dredges		Tongs		Rakes		Total, exclusive of duplication	
OPERATING UNITS								
Fishermen:	*Number*		*Number*		*Number*		*Number*	
On vessels		79						79
On boats and shore:								
Regular				6				6
Casual		12		123		41		172
Total		91		129		41		257
Vessels:								
Steam		4						4
Net tonnage		344						344
Motor		13						13
Net tonnage		140						140
Sail		3						3
Net tonnage		23						23
Total vessels		20						20
Total net tonnage		507						507
Boats:								
Motor		6						6
Other				93		19		112
Apparatus:								
Number		97		129		41		267
Length, yards		88						88
CATCH								
Oysters:	*Bushels*	*Value*	*Bushels*	*Value*	*Bushels*	*Value*	*Bushels*	*Value*
Seed, public, spring	23,104	$12,507	4,260	$2,343	1,800	$990	29,164	$15,840
Seed, public, fall	19,316	8,985	20,989	9,535	2,145	1,073	42,450	19,593
Seed, private, spring	135,256	73,840	1,100	605			136,356	74,445
Seed, private, fall	19,000	9,000	1,200	600			20,200	9,600
Total	196,676	104,332	27,549	13,083	3,945	2,063	228,170	119,478

NOTE.—Of the number of persons fishing for seed oysters none in the dredge fishery, 108 in the fishery by tongs, and all in the fishery by rakes are duplicated among those fishing in the market oyster fishery or in fisheries for other species. Similarly, none of the vessels, none of the motor boats or dredges was duplicated in the dredge fishery; 81 of the other boats, and 112 tongs were duplicated in the fishery by tongs; and all other boats and rakes were duplicated in the fishery by rakes.

VESSEL FISHERIES AT THE PRINCIPAL NEW ENGLAND PORTS

ECONOMIC ASPECT

The landings of fishery products at the 3 principal New England ports (Boston and Gloucester, Mass., and Portland, Maine), by vessels of 5 net tons and over, during 1932, amounted to 252,334,325 pounds as landed, valued at $6,083,851. This is a decrease of 4 percent in the quantity of the catch as compared with 1931, and a decrease of 34 percent in the value of the catch. Of the total landings 99 percent consisted of fresh fish and 1 percent, salted fish. The landings at Boston accounted for 215,618,979 pounds, valued at $5,366,925 or 85 percent of the total quantity. The landings at Gloucester in 1932 amounted to 25,328,213 pounds, valued at $434,076 or 10 percent of the total quantity. Landings at Portland amounted to 11,387,133 pounds, valued at $282,850, or 5 percent of the total landings.

Among the landings of fresh fish, haddock outranked other species in volume landed, the amount of all sizes in 1932 being 120,116,874 pounds or 48 percent of the total fresh fish.

Landings by fishing vessels at principal New England ports, 1932

BOSTON: BY MONTHS

Species	January		February		March		April	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Cod, fresh:								
Large	1,812,800	$53,097	2,397,825	$90,181	3,352,945	$105,495	2,467,689	$36,395
Market	1,963,185	48,450	1,419,820	43,138	2,212,555	54,627	1,900,153	20,345
Scrod	40,960	775	17,940	359	28,075	396		
Cod, salted: Large							3,700	92
Haddock, fresh:								
Large	5,885,565	238,511	9,165,780	335,958	9,563,825	294,547	11,676,315	187,317
Scrod	2,101,119	47,701	3,209,090	78,035	2,051,440	48,627	1,223,170	12,289
Hake, fresh:								
Large	616,150	14,435	638,230	21,525	398,261	14,206	212,400	3,603
Small	800	11			800	32	1,000	40
Pollock, fresh	752,300	7,668	588,445	14,529	479,785	13,867	663,290	4,673
Pollock, salted							7,300	73
Cusk, fresh	500,070	8,519	263,160	6,717	124,670	3,173	157,970	1,646
Halibut, fresh	65,982	12,657	158,183	27,369	138,390	17,375	263,210	31,184
Mackerel, fresh					120	10		
Flounders, fresh	708,113	37,507	595,766	37,063	521,847	30,551	559,325	16,919
Other, fresh	174,382	3,533	231,565	5,490	348,140	9,487	428,105	6,431
Total, fresh	14,621,426	472,864	18,685,804	660,364	19,220,853	592,393	19,552,627	320,842
Total, salted							11,000	165
Grand total	14,621,426	472,864	18,685,804	660,364	19,220,853	592,393	19,563,627	321,007
Landed in 1931: Fresh	16,449,890	688,271	19,180,475	793,063	25,772,140	887,774	19,606,998	438,496

Species	May		June		July	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Cod, fresh:						
Large	1,786,817	$33,189	1,318,563	$38,122	1,701,640	$30,411
Market	1,853,664	21,473	1,537,119	23,951	3,203,475	31,765
Scrod	200	2	100	1		
Cod, salted:						
Large	10,000	300	16,000	493	700	14
Market			8,000	248	450	11
Haddock, fresh:						
Large	7,767,205	157,897	5,962,335	149,591	6,555,835	126,379
Scrod	2,437,390	20,414	2,539,610	21,084	1,994,270	15,968
Hake, fresh:						
Large	172,825	2,903	195,955	2,051	132,760	1,048
Small	4,500	92	1,500	15	6,400	44
Pollock, fresh	276,047	3,024	170,340	2,148	214,180	1,965
Cusk, fresh	283,520	2,339	176,665	1,371	90,655	825
Halibut, fresh	382,242	34,102	255,333	28,985	252,975	25,684
Mackerel, fresh	3,885,771	98,252	4,056,140	94,441	3,247,779	47,373
Flounders, fresh	660,535	12,281	492,755	10,226	240,365	8,987
Swordfish, fresh			194,940	44,899	633,403	96,309
Herring, fresh			4,000	30		
Other, fresh	262,471	3,198	140,922	1,834	79,405	1,557
Total, fresh	19,773,187	389,166	17,046,277	418,749	18,353,142	388,315
Total, salted	10,000	300	24,000	741	1,150	25
Grand total	19,783,187	389,466	17,070,277	419,490	18,354,292	388,340
Landed in 1931:						
Fresh	18,028,617	514,462	18,675,995	664,482	19,650,407	720,438
Salted	8,290	269				
Total	18,036,907	514,731	18,675,995	664,482	19,650,407	720,438

NOTE.—The weights of fresh and salted fish given in these statistics represent the fish as landed from the vessels, and the values are those received by the fishermen. Large cod are classified as those weighing over 10 pounds; market cod, 2½ to 10 pounds; and scrod cod, 1 to 2½ pounds. Large haddock are those weighing 2½ pounds and scrod haddock, 1 to 2½ pounds. Large hake are those weighing over 6 pounds and small hake, under 6 pounds. Only landings by vessels having a capacity of 5 net tons or greater are used in this tabulation.

Landings by fishing vessels at principal New England ports, 1932—Continued

BOSTON: BY MONTHS—Continued

Species	August		September		October		November	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Cod, fresh:								
Large	1, 583, 130	$31, 045	1, 052, 973	$33, 336	1, 347, 785	$39, 668	1, 233, 342	$47, 623
Market	3, 701, 215	29, 933	2, 400, 685	35, 860	2, 713, 595	44, 465	2, 351, 665	58, 195
Scrod	1, 000	5	160	2	1, 000	10	900	9
Cod, salted:								
Large	630	19			15, 000	510	1, 785	90
Market	16, 550	166					7, 360	162
Haddock, fresh:								
Large	6, 777, 285	136, 632	7, 546, 640	160, 329	6, 444, 020	171, 031	4, 880, 995	196, 513
Scrod	2, 772, 740	19, 141	3, 919, 780	31, 009	2, 918, 710	35, 460	1, 504, 445	39, 819
Hake, fresh:								
Large	418, 985	2, 825	373, 150	4, 750	758, 455	7, 685	826, 535	15, 616
Small					500	5	3, 500	79
Pollock, fresh	317, 025	2, 539	246, 271	2, 847	466, 145	3, 429	711, 230	6, 378
Cusk, fresh	28, 695	358	82, 445	1, 084	167, 085	2, 326	333, 115	5, 315
Halibut, fresh	304, 288	26, 808	141, 756	15, 699	73, 233	8, 577	22, 497	4, 918
Mackerel, fresh	3, 433, 666	53, 264	4, 016, 830	54, 572	4, 895, 288	56, 576	1, 338, 680	39, 387
Flounders, fresh	353, 665	12, 012	407, 970	20, 543	592, 940	21, 024	902, 075	35, 706
Swordfish, fresh	1, 077, 157	113, 544	344, 447	58, 198	7, 575	2, 142		
Herring, fresh	3, 000	45						
Other, fresh	58, 980	2, 445	40, 054	2, 185	74, 848	3, 640	67, 046	3, 374
Total, fresh	20, 830, 781	430, 596	20, 573, 161	420, 414	20, 461, 179	396, 038	14, 176, 025	452, 927
Total, salted	17, 180	185			15, 000	510	9, 145	252
Grand total	20, 847, 961	430, 781	20, 573, 161	420, 414	20, 476, 179	396, 548	14, 185, 170	453, 179
Landed in 1931:								
Fresh	19, 054, 222	787, 485	18, 084, 618	745, 525	16, 498, 909	670, 316	16, 315, 902	535, 637
Salted			7, 400	291				
Total	19, 054, 222	787, 485	18, 092, 018	745, 816	16, 498, 909	670, 316	16, 315, 902	535, 637

Species	December		Total, 1932		1931	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Cod fresh:						
Large	1, 389, 665	$48, 144	21, 445, 174	$586, 706	23, 932, 629	$794, 081
Market	1, 660, 515	41, 833	26, 917, 646	454, 035	25, 730, 600	620, 059
Scrod	10, 680	178	101, 015	1, 737	244, 345	3, 882
Cod, salted:						
Large			47, 815	1, 518	12, 690	440
Market			32, 360	587		
Haddock, fresh:						
Large	4, 858, 175	213, 442	87, 083, 975	2, 368, 147	106, 028, 345	3, 819, 572
Scrod	977, 990	29, 805	27, 649, 754	399, 352	14, 258, 395	261, 610
Hake, fresh:						
Large	903, 795	20, 529	5, 647, 501	111, 176	5, 860, 915	142, 802
Small			19, 000	318	43, 420	1, 144
Hake, salted:						
Small	4, 000	80	4, 000	80		
Pollock, fresh	890, 385	7, 540	5, 775, 443	70, 602	5, 027, 987	83, 717
Pollock, salted			7, 300	73		
Cusk, fresh	284, 545	4, 514	2, 492, 595	38, 187	3, 447, 091	68, 290
Halibut, fresh	26, 137	5, 818	2, 084, 176	239, 176	2, 309, 826	341, 734
Mackerel, fresh	400, 200	16, 339	25, 274, 474	460, 214	19, 855, 052	889, 633
Mackerel, salted					3, 000	120
Flounders, fresh	761, 448	31, 860	6, 796, 804	274, 679	9, 493, 487	420, 205
Swordfish, fresh			2, 257, 522	315, 092	1, 526, 342	399, 629
Herring, fresh	500	15	7, 500	90	5, 700	142
Other, fresh	69, 007	1, 982	1, 974, 925	45, 156	2, 165, 179	59, 434
Total, fresh	12, 233, 042	421, 999	215, 527, 504	5, 364, 667	219, 929, 313	7, 905, 934
Total, salted	4, 000	80	91, 475	2, 258	15, 690	560
Grand total	12, 237, 042	422, 079	215, 618, 979	5, 366, 925	219, 945, 003	7, 906, 494
Landed in 1931:						
Fresh	12, 611, 140	459, 985			219, 929, 313	7, 905, 934
Salted					15, 690	560
Total	12, 611, 140	459, 985			219, 945, 003	7, 906, 494

Landings by fishing vessels at principal New England ports, 1932—Continued

GLOUCESTER: BY MONTHS

Species	January		February		March		April	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Cod, fresh:								
Large	145,780	$5,881	298,820	$15,391	355,960	$10,571	936,850	$16,624
Market	4,615	113	2,480	71	25,730	281	252,155	2,522
Scrod	295	4	115	1	-------	-------	50	-------
Haddock, fresh:								
Large	53,575	2,393	83,700	3,454	326,620	8,900	872,655	17,280
Scrod	9,960	170	4,190	60	1,470	30	2,840	15
Hake, fresh:								
Large	31,380	473	20,680	376	15,016	261	1,940	14
Pollock, fresh	6,715	83	240	4	6,145	42	34,900	228
Cusk, fresh	150	3	180	3	1,895	20	8,105	59
Halibut, fresh	89	21	10	2	19	3	-------	-------
Flounders, fresh	97,375	4,344	39,995	1,906	35,930	1,992	16,075	343
Other, fresh	6,445	35	7,270	52	4,280	26	490	3
Total, fresh	356,379	13,520	457,680	21,320	773,065	22,126	2,126,060	37,088
Landed in 1931:								
Fresh	867,918	30,642	586,930	27,504	1,431,771	41,486	3,259,315	71,660
Salted	1,441,368	51,915	-------	-------	-------	-------	117,481	4,422
Total	2,309,286	82,557	586,930	27,504	1,431,771	41,486	3,376,796	76,082

Species	May		June		July	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Cod, fresh:						
Large	987,780	$17,424	431,685	$9,475	342,210	$6,012
Market	398,760	3,738	106,915	1,072	399,910	3,999
Scrod	40	-------	-------	-------	840	2
Cod, salted:						
Large	111,445	3,095	104,200	3,127	144,240	4,798
Market	8,645	155	13,010	262	131,264	3,248
Scrod	-------	-------	-------	-------	25,400	381
Haddock, fresh:						
Large	260,605	4,802	80,682	1,056	187,780	1,894
Scrod	7,750	59	13,000	103	111,015	833
Hake, fresh:						
Large	11,400	65	37,175	279	47,220	895
Hake, salted:						
Large	470	5	-------	-------	-------	-------
Pollock, fresh	19,430	126	4,130	28	34,940	218
Pollock, salted	-------	-------	95	1	1,200	12
Cusk, fresh	21,840	129	93,185	690	39,555	305
Cusk, salted	120	2	260	3	1,200	15
Halibut, salted	-------	-------	505	36	-------	-------
Mackerel, fresh	279,955	4,341	754,315	12,043	1,328,100	13,710
Flounders, fresh	8,780	205	21,730	570	53,300	1,219
Swordfish, fresh	-------	-------	-------	-------	3,283	382
Herring, fresh	19,000	190	-------	-------	2,000	20
Herring, salted	134,800	5,055	-------	-------	-------	-------
Other, fresh	150	2	3,488	75	1,175	30
Total, fresh	2,015,490	31,081	1,546,305	25,391	2,550,828	29,019
Total, salted	255,480	8,312	118,070	3,429	303,304	8,454
Grand total	2,270,970	39,393	1,664 375	28,820	2,854,132	37,473
Landed in 1931:						
Fresh	2,149,496	52,449	1,109,150	34,163	1,844,862	52,817
Salted	263,360	9,037	148,160	5,063	122,725	4,073
Total	2,412,856	61,486	1,257,310	39,226	1,967,587	56,890

Landings by fishing vessels at principal New England ports, 1932—Continued

GLOUCESTER: BY MONTHS—Continued

Species	August		September		October		November	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Cod, fresh:								
Large	413,805	$6,214	366,756	$15,658	467,160	$16,925	73,635	$3,352
Market	512,680	5,126	57,565	577	44,795	452	2,135	40
Scrod	1,480	8			135	3	10	
Cod, salted:								
Large	82,560	2,564	148,250	4,532	69,570	2,126		
Market	7,075	151	91,480	1,833	164,085	4,156		
Scrod			85,665	857	10,900	109		
Haddock, fresh:								
Large	143,790	1,456	85,780	1,469	58,795	1,576	26,285	1,087
Scrod	41,895	316	18,440	92	6,170	51	200	4
Hake, fresh:								
Large	26,225	155	125,595	1,458	581,195	3,122	74,405	1,418
Hake, salted:								
Large	575	9						
Pollock, fresh	45,855	298	75,845	1,237	314,320	1,839	476,385	3,987
Cusk, fresh	59,312	407	5,110	33	6,450	43	670	6
Cusk, salted	2,420	37						
Halibut, fresh	29,472	2,432	105,348	5,982	11,385	1,594	15,984	1,752
Halibut, salted	245	17	90	6				
Mackerel, fresh	2,027,235	20,591	3,090,597	29,606	2,644,180	18,219	486,838	21,880
Mackerel, salted	5,050	180	7,075	93	11,100	423		
Flounders, fresh	19,750	693	425	19	23,165	553	30,355	1,025
Swordfish, fresh	3,072	277	677	130				
Other, fresh	142,500	1,074	52,100	359	3,990	270	3,890	62
Total, fresh	3,467,071	39,047	3,984,238	56,620	4,161,740	44,647	1,190,792	34,613
Total, salted	97,925	2,958	332,560	7,321	255,655	6,814		
Grand total	3,564,996	42,005	4,316,798	63,941	4,417,395	51,461	1,190,792	34,613
Landed in 1931:								
Fresh	3,452,270	101,021	2,996,267	94,280	1,274,255	49,638	1,737,836	64,105
Salted	537,939	17,356	69,505	2,448	41,390	1,398		
Total	3,990,209	118,377	3,065,772	96,728	1,315,645	51,036	1,737,836	64,105

Species	December		Total, 1932		1931	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Cod, fresh:						
Large	62,720	$2,743	4,883,161	$126,270	4,670,912	$151,511
Market	5,930	122	1,813,670	18,113	897,257	14,215
Scrod	655	6	3,120	24	10,440	159
Cod, salted:						
Large			660,265	20,242	1,028,832	36,262
Market			415,559	9,805	201,532	5,015
Scrod			121,965	1,347	5,645	85
Haddock, fresh:						
Large	32,290	1,359	2,212,557	46,726	4,847,223	134,093
Scrod	1,155	19	218,085	1,752	207,750	2,485
Haddock, salted:						
Large					810	12
Hake, fresh:						
Large	56,920	1,295	1,029,151	9,311	596,375	11,480
Small					1,130	12
Hake, salted:						
Large			1,045	14	5,100	66
Pollock, fresh	156,045	1,554	1,174,950	9,644	1,397,103	19,313
Pollock, salted			1,295	13	1,262	24
Cusk, fresh	405	4	236,857	1,702	140,990	1,674
Cusk, salted			4,000	57	4,805	93
Halibut, fresh	13	1	162,320	11,787	55,469	5,632
Halibut, salted			840	59	245	30
Mackerel, fresh	419,788	17,953	11,031,008	138,343	7,298,373	273,477
Mackerel, salted			23,225	698	52,329	2,210
Flounders, fresh	69,115	2,111	415,995	14,980	408,675	21,199
Swordfish, fresh			7,032	789	10,620	2,090
Herring, fresh			21,000	210	204,700	3,684
Herring, salted	520,900	15,075	655,700	20,130	2,286,876	80,589
Other, fresh	9,635	74	235,413	2,062	455,350	9,813
Total, fresh	814,671	27,241	23,444,319	381,713	21,262,367	651,437
Total, salted	520,900	15,075	1,883,894	52,363	3,587,436	124,386
Grand total	1,335,571	42,316	25,328,213	434,076	24,849,803	775,823
Landed in 1931:						
Fresh	552,297	31,672			21,262,367	651,437
Salted	845,508	28,674			3,587,436	124,386
Total	1,397,805	60,346			24,849,803	775,823

Landings by fishing vessels at principal New England ports, 1932—Continued

PORTLAND: BY MONTHS

Species	January		February		March		April	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Cod, fresh:								
Large	76,085	$2,516	69,497	$2,830	109,999	$3,790	377,970	$6,009
Market	47,694	938	32,709	809	66,704	1,364	156,925	1,602
Scrod	3,580	37	1,035	11	445	4	1,840	11
Cod, salted:								
Large	-----	-----	-----	-----	-----	-----	885	27
Market	-----	-----	-----	-----	-----	-----	610	12
Haddock, fresh:								
Large	189,387	10,094	191,402	9,208	417,451	12,276	895,379	13,574
Scrod	3,690	48	1,178	14	2,171	21	1,535	8
Hake, fresh:								
Large	29,835	510	31,819	922	30,054	708	16,294	220
Small	66,963	1,201	49,857	1,344	50,206	1,109	15,049	168
Pollock, fresh	72,635	364	48,946	526	29,785	417	64,286	465
Pollock, salted	-----	-----	-----	-----	-----	-----	265	1
Cusk, fresh	45,845	813	50,618	1,219	70,174	1,498	51,187	576
Cusk, salted	-----	-----	-----	-----	-----	-----	90	1
Halibut, fresh	196	35	411	87	130	21	19,134	1,532
Flounders, fresh	16,645	652	4,993	186	26,183	1,101	20,395	231
Other, fresh	32,388	676	32,822	796	40,774	895	56,856	1,086
Total, fresh	584,943	17,884	515,287	17,952	844,076	23,264	1,676,850	25,482
Total, salted	-----	-----	-----	-----	-----	-----	1,850	41
Grand total	584,943	17,884	515,287	17,952	844,076	23,264	1,678,700	25,523
Landed in 1931:								
Fresh	833,153	31,783	633,840	25,073	1,855,017	51,570	6,146,501	144,198

Species	May		June		July	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Cod, fresh:						
Large	220,485	$3,248	258,012	$7,014	428,055	$10,381
Market	88,759	834	31,623	339	17,180	175
Scrod	1,320	7	3,630	20	550	3
Cod, salted:						
Large	3,385	107	1,785	61	251	10
Market	1,615	37	1,330	33	250	5
Scrod	35	1	-----	-----	55	1
Haddock, fresh:						
Large	234,291	3,738	148,339	4,688	133,205	4,304
Scrod	250	1	5,625	31	7,103	41
Hake, fresh:						
Large	10,019	117	9,195	45	6,915	47
Small	41,795	426	49,512	312	46,925	323
Hake, salted:						
Small	-----	-----	280	1	-----	-----
Pollock, fresh	85,790	311	54,140	286	88,582	446
Pollock, salted	350	2	-----	-----	-----	-----
Cusk, fresh	15,003	146	1,845	8	1,516	9
Cusk, salted	70	1	-----	-----	-----	-----
Halibut, fresh	25,867	2,303	40,224	3,890	6,277	682
Mackerel, fresh	2,410	96	25,300	615	164,151	1,924
Flounders, fresh	27,237	380	16,105	429	29,128	587
Swordfish, fresh	-----	-----	26,358	4,890	104,555	13,446
Herring, fresh	32,000	160	39,000	195	-----	-----
Other, fresh	3,379	45	22,061	421	37,918	555
Total, fresh	788,605	11,812	730,969	23,183	1,072,120	32,923
Total, salted	5,455	148	3,395	95	556	16
Grand total	794,060	11,960	734,364	23,278	1,072,676	32,939
Landed in 1931:						
Fresh	862,575	19,695	681,602	28,120	912,444	57,691
Salted	-----	-----	6,905	217	4,275	140
Total	862,575	19,695	688,507	28,337	916,719	57,837

Landings by fishing vessels at principal New England ports, 1932—Continued

PORTLAND: BY MONTHS—Continued

Species	August		September		October		November	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Cod, fresh:								
Large	347,371	$11,688	327,128	$14,388	146,212	$5,060	79,103	$3,455
Market	15,616	146	20,978	309	31,436	412	27,887	532
Scrod	1,065	6	2,265	15	3,087	21	2,135	18
Haddock, fresh:								
Large	126,788	4,870	93,362	4,861	144,330	7,026	137,857	7,755
Scrod	9,150	78	7,932	65	12,625	124	10,106	92
Hake, fresh:								
Large	2,420	17	6,185	96	3,650	27	2,995	60
Small	46,125	334	88,855	888	145,468	1,486	152,601	2,927
Hake, salted:								
Small							175	3
Pollock, fresh	107,473	536	103,537	697	84,427	425	71,360	448
Cusk, fresh	1,401	12	6,772	83	26,130	321	24,696	481
Halibut, fresh	12,734	1,267	676	45	1,514	154	817	104
Halibut, salted							195	6
Mackerel, fresh	664,273	9,690	788,396	4,789	30,621	1,267	2,170	182
Mackerel, salted	55,000	413	35,500	178				
Flounders, fresh	38,895	853	18,155	466	15,047	335	1,822	87
Swordfish, fresh	132,183	12,574	73,553	9,599	2,712	543		
Other, fresh	70,901	778	156,794	527	32,545	639	24,956	466
Total, fresh	1,576,395	42,849	1,694,588	36,828	679,803	17,840	538,505	16,607
Total, salted	55,000	413	35,500	178			370	9
Grand total	1,631,395	43,262	1,730,088	37,006	679,803	17,840	538,875	16,616
Landed in 1931:								
Fresh	2,403,087	91,593	1,501,536	43,717	1,543,243	35,166	862,319	20,902
Salted	19,850	460	26,625	960	85	3		
Total	2,422,937	92,053	1,528,161	44,677	1,543,328	35,169	862,319	20,902

Species	December		Total, 1932		1931	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Cod, fresh:						
Large	67,522	$2,278	2,507,439	$72,657	3,314,761	$119,625
Market	30,009	542	567,519	8,002	514,116	11,069
Scrod	2,980	23	23,932	176	33,364	314
Cod, salted:						
Large			6,306	205	41,635	1,512
Market			3,805	87	6,070	155
Scrod			90	2	115	2
Haddock, fresh:						
Large	170,286	7,819	2,882,137	90,213	7,429,541	215,848
Scrod	9,001	95	70,366	618	73,401	749
Hake, fresh:						
Large	46,055	782	195,436	3,551	310,323	5,993
Small	95,175	1,600	848,531	12,138	938,564	16,484
Hake, salted:						
Small			455	4	155	1
Pollock, fresh	79,678	433	890,639	5,354	1,205,240	10,684
Pollock, salted			615	3	10	
Cusk, fresh	40,201	651	335,388	5,817	671,521	13,148
Cusk, salted			160	2	200	3
Halibut, fresh	553	71	108,533	10,191	204,696	28,470
Halibut, salted			195	6		
Mackerel, fresh			1,677,321	18,563	2,305,421	60,120
Mackerel, salted			90,500	591	9,555	113
Flounders, fresh	15,429	551	230,034	5,858	313,182	9,461
Swordfish, fresh			339,361	41,052	223,367	56,426
Herring, fresh			71,000	355	667,430	4,670
Other, fresh	25,977	521	537,371	7,405	627,111	12,093
Total, fresh	582,866	15,326	11,285,007	281,950	18,832,038	565,154
Total, salted			102,126	900	57,740	1,786
Grand total	582,866	15,326	11,387,133	282,850	18,889,778	566,940
Landed in 1931:						
Fresh	596,721	15,646			18,832,038	565,154
Salted					57,740	1,786
Total	596,721	15,646			18,889,778	566,940

Landings by fishing vessels at principal New England ports, 1932—Continued

SUMMARY: BY PORTS

Species	Boston		Gloucester		Portland	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Cod, fresh:						
Large	21,445,174	$586,706	4,883,161	$126,270	2,507,439	$72,657
Market	26,917,646	454,035	1,813,670	18,113	567,519	8,002
Scrod	101,015	1,737	3,120	24	23,932	176
Cod, salted:						
Large	47,815	1,518	660,265	20,242	6,306	205
Market	32,360	587	415,559	9,805	3,805	87
Scrod	----	----	121,965	1,347	90	2
Haddock, fresh:						
Large	87,083,975	2,368,147	2,212,557	46,726	2,882,137	90,213
Scrod	27,649,754	399,352	218,085	1,752	70,366	618
Hake, fresh:						
Large	5,647,501	111,176	1,029,151	9,311	195,436	3,551
Small	19,000	318	----	----	848,531	12,138
Hake, salted:						
Large	----	----	1,045	14	----	----
Small	4,000	80	----	----	455	4
Pollock, fresh	5,775,443	70,602	1,174,950	9,644	890,639	5,354
Pollock, salted	7,300	73	1,295	13	615	3
Cusk, fresh	2,492,505	38,187	236,857	1,702	335,388	5,817
Cusk, salted	----	----	4,000	57	160	2
Halibut, fresh	2,084,176	239,176	162,320	11,787	108,533	10,191
Halibut, salted	----	----	840	59	195	6
Mackerel, fresh	25,274,474	460,214	11,031,008	138,343	1,677,321	18,563
Mackerel, salted	----	----	23,225	696	90,500	591
Flounders, fresh	6,796,804	274,679	415,995	14,980	230,034	5,858
Swordfish, fresh	2,257,522	315,092	7,032	789	339,361	41,052
Herring, fresh	7,500	90	21,000	210	71,000	355
Herring, salted	----	----	655,700	20,130	----	----
Other, fresh	1,974,925	45,156	235,413	2,062	537,371	7,405
Total, fresh	215,527,504	5,364,667	23,444,319	381,713	11,285,007	281,950
Total, salted	91,475	2,258	1,883,894	52,363	102,126	900
Grand total	215,618,979	5,366,925	25,328,213	434,076	11,387,133	282,850
Landed in 1931:						
Fresh	219,929,313	7,905,934	21,262,367	651,437	18,832,038	565,154
Salted	15,690	560	3,587,436	124,386	57,740	1,786
Total	219,945,003	7,906,494	24,849,803	775,823	18,889,778	566,940

Species	Total, 1932		1931	
	Pounds	*Value*	*Pounds*	*Value*
Cod, fresh:				
Large	28,835,774	$785,633	31,918,302	$1,065,217
Market	29,298,835	480,150	27,141,973	645,343
Scrod	128,067	1,937	288,149	4,355
Cod, salted:				
Large	714,386	21,965	1,083,157	38,214
Market	451,724	10,479	207,602	5,170
Scrod	122,055	1,349	5,760	87
Haddock, fresh:				
Large	92,178,669	2,505,086	118,305,109	4,169,513
Scrod	27,938,205	401,722	14,539,546	264,844
Haddock, salted:				
Large	----	----	810	12
Hake, fresh:				
Large	6,872,088	124,038	6,767,613	160,275
Small	867,531	12,456	983,114	17,640
Hake, salted:				
Large	1,045	14	5,100	66
Small	4,455	84	155	1
Pollock, fresh	7,841,032	85,600	7,630,330	113,714
Pollock, salted	9,210	89	1,272	24
Cusk, fresh	3,064,840	45,706	4,259,602	83,112
Cusk, salted	4,160	59	5,005	96
Halibut, fresh	2,355,029	261,154	2,569,991	375,836
Halibut, salted	1,035	65	245	30
Mackerel, fresh	37,982,803	617,120	29,458,846	1,223,230
Mackerel, salted	113,725	1,287	64,884	2,443
Flounders, fresh	7,442,833	295,517	10,275,344	450,865
Swordfish, fresh	2,603,915	356,933	1,700,329	458,745

Landings by fishing vessels at principal New England ports, 1932—Continued

SUMMARY: By PORTS—Continued

Species	Total, 1932		1931	
	Pounds	*Value*	*Pounds*	*Value*
Herring, fresh	99,500	$655	877,830	$8,496
Herring, salted	655,700	20,130	2,286,876	80,589
Other, fresh	[1] 2,747,709	54,623	3,247,640	81,340
Total, fresh	250,256,830	6,028,330	260,023,718	9,122,525
Total, salted	2,077,495	55,521	3,660,866	126,732
Grand total	252,334,325	6,083,851	263,684,584	9,249,257
Landed in 1931:				
Fresh			260,023,718	9,122,525
Salted			3,660,866	126,732
Total			263,684,584	9,249,257

[1] The items under "Other, fresh" include albacore, 927 pounds, value $111; alewives, 385,674 pounds, value $2,017; butterfish, 145,149 pounds, value $9,058; croaker, 2,400 pounds, value $72; cunner (perch), 385 pounds, value $6; eels, 25 pounds, value $1; rosefish, 57,230 pounds, value $521; salmon, 18 pounds, value $3; scup, 6,900 pounds, value $207; sea bass, 170 pounds, value $5; shad, 7,351 pounds, value $213; sharks, 44,428 pounds, value $486; skates, 14,070 pounds, value $131; smelt, 3,600 pounds, value $169; sturgeon, 6,123 pounds, value $436; tuna or "horse mackerel", 3,244 pounds, value $137; whiting, 143,445 pounds, value $4,242; wolffish, 1,583,094 pounds, value $27,329; lobsters, 162 pounds, value $41; scallops, 2,307 pounds, value $576; squid, 100 pounds, value $4; livers, 280,480 pounds, value $5,605; and spawn, 60,477 pounds, value $3,253.

BIOLOGICAL ASPECT

In 1932 the fishing fleet landing fares at Boston and Gloucester, Mass., and Portland, Maine, and operating on the fishing banks of the North Atlantic from Flemish Cap to New York, numbered 372 steam, motor, and sail vessels of over 5 net tons as measured by the United States Customs Service. These made 11,112 trips to the fishing grounds, and were absent from port 48,729 days, or an average of about 4.4 days per trip. This is 0.4 of a day less than the average length of a trip during 1931. Their catches of edible fish landed at the three ports amounted to 253,907,536 pounds when the salted fish had been converted to the basis of fresh gutted or round fish as landed. This does not represent the entire catch of edible fish of these vessels, for small quantities estimated at not more than 5 percent of their total catch were landed at ports in New England other than these three, at New York City, and at ports in New Jersey.

Otter trawls on all sizes of vessels accounted for 142,196,578 pounds, or 56 percent of the total catch. Line trawls were next in importance, accounting for 57,267,269 pounds, or 23 percent of the total catch landed at the three ports in 1932.

The catch taken on Georges Bank was considerably larger than that taken on any other fishing ground and landed at the three ports in 1932. It amounted to 93,896,295 pounds, or 37 percent of the total catch.

The landings from South Channel amounted to 36,265,135 pounds, or 14 percent of the total and from Browns Bank, 25,712,196 pounds, or 10 percent.

Landings by fishing vessels at the 3 principal New England ports, 1932

BY GEAR AND FISHING GROUNDS

Gear and fishing grounds	Vessels fishing	Trips	Days absent	Cod			Haddock		Hake	
				Large	Market	Scrod	Large	Scrod	Large	Small
	Number	*Number*	*Number*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Line trawls:										
Grand Bank	3	8	197	20,269	2,228				1,477	
St. Peters Bank	3	3	56							
Off Newfoundland	1	1	19	93,233	86,048	84,808				
Seal Island Grounds	6	5	52	50,150	90,200		124,300	29,050	1,000	
Gulf of St. Lawrence	3	5	140	431,438	660,013	156,683				
Scatari Bank	3	3	43	67,296	14,829					
Quereau Bank	9	18	379	150,289	10,819		1,700		17,638	
The Gully	3	3	45							
Sable Island Bank (Western Bank)	19	30	432	604,260	525,091		1,059,800		31,780	
Cape Shore	32	81	860	600,588	1,004,040	120	1,269,815	126,370	281,000	
Emerald Bank	5	6	86	105,100	66,700		306,400	12,200	8,975	
La Have Bank	33	84	1,006	1,204,555	1,236,298	1,400	2,730,027	15,000	132,410	
Roseway Bank	3	3	33	44,910	66,240		33,600	500	2,700	
Browns Bank	45	260	2,868	2,577,393	2,817,268	1,720	8,398,445	84,390	463,050	
Georges Bank	45	186	1,992	3,701,784	1,801,120	380	2,893,480	83,375	309,205	
South Channel	42	222	1,607	1,894,150	1,473,335	1,900	4,238,695	102,120	1,022,670	1,000
Off Highland Light	3	5	40	5,500	2,435		55,400	980	15,070	
Off Chatham	10	17	141	26,260	22,725		148,950	7,975	19,210	
Nantucket Shoals	3	3	17	6,950	7,260		12,950	1,000	2,615	
Cashes Bank	13	33	159	64,003	51,956	1,881	111,942	5,679	91,995	55,495
Fippenies Bank	12	23	118	63,515	30,155		95,540	6,075	212,260	6,075
Platts Bank	3	5	14	4,760	2,720	625	10,920	1,260	3,170	12,480
Jeffreys Ledge	24	188	451	118,031	82,512	6,160	576,636	25,964	174,950	230,090
Tillies Bank	2	2	6	530	350		8,850	150	4,800	
Middle Bank (Stellwagen Bank)	18	70	348	74,830	39,990		560,885	16,765	324,185	
Shore, general	53	280	821	291,841	220,055	16,240	862,637	34,088	258,459	273,613
Total	[1] 109	1,544	11,930	12,156,635	10,314,387	271,917	23,501,062	552,941	3,378,619	578,753
Hand lines:										
Cape Shore	2	5	54	54,650	69,160	900	1,360		50	
Browns Bank	7	8	85	135,693	141,850		34,480			
Georges Bank	7	29	252	691,345	256,395	2,300	9,570		855	
Nantucket Shoals	6	25	199	123,790	120,455	100	965			
Shore, general	4	5	26	11,499	10,756		230		1,125	
Shore, general (occasional)				1,007	790	109			60	
Total	[1] 13	72	616	1,017,984	599,406	3,409	46,605		2,090	

[1] Exclusive of duplication.

Landings by fishing vessels at the 3 principal New England ports, 1932—Continued

BY GEAR AND FISHING GROUNDS—Continued

Gear and fishing grounds	Vessels fishing	Trips	Days absent	Cod			Haddock		Hake	
				Large	Market	Scrod	Large	Scrod	Large	Small
Harpoons:	*Number*	*Number*	*Number*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Cape Shore	11	11	287							
Browns Bank	33	41	687							
Georges Bank	66	181	3,419							
Nantucket Shoals	7	8	112							
Cashes Bank	1	1	15							
South	1	1	4							
Shore, general	14	19	289							
Total	[1] 69	262	4,813							
Otter trawls, large:										
St. Peters Bank	1	1	17	16,200	54,700		61,500			
Sable Island Bank (Western Bank)	37	91	1,093	2,056,207	2,419,050	13,480	5,613,445	440,580	106,795	
Cape Shore	3	5	54	18,185	30,870	1,940	228,610	57,260	19,460	
Emerald Bank	4	4	41	64,550	82,980		194,300	11,100	3,925	
La Have Bank	23	39	465	531,255	682,140	12,160	1,608,690	259,345	86,216	
Browns Bank	31	60	615	1,041,480	798,898	3,470	4,073,195	454,565	69,080	
Georges Bank	47	673	6,254	4,361,864	9,366,499	34,775	25,388,970	16,576,409	851,770	6,200
South Channel	39	187	1,694	965,170	845,275	5,330	7,693,865	2,215,950	503,010	8,900
Off Highland Light	1	1	7	500	700		55,500	6,800	150	
Off Chatham	3	5	38	9,175	10,720	1,000	204,150	28,975	11,900	
Nantucket Shoals	10	11	95	33,295	122,870		517,185	91,090	16,285	
Shore, general	2	2	3	2,350	19,700		17,500	13,600	350	
Total	[1] 52	1,079	10,376	9,100,231	14,434,402	72,155	45,656,910	20,155,674	1,668,941	15,100
Otter trawls, medium:										
Sable Island Bank (Western Bank)	3	4	38	89,900	119,200		376,700	5,800	7,750	
Cape Shore	2	4	36	18,175	48,535		46,670	4,600	1,445	
La Have Bank	5	5	49	22,275	13,570		192,250	15,500	5,230	
Browns Bank	19	29	277	262,490	243,030		1,022,175	100,550	7,400	
Georges Bank	48	465	4,059	1,579,130	2,361,278	15,850	8,622,735	4,186,050	220,540	800
Clark Bank	2	2	15	2,280	2,450		37,100	16,200	3,930	
South Channel	41	308	2,561	670,693	1,082,645	4,850	7,197,650	2,228,910	348,045	9,720
Off Highland Light	6	7	50	8,320	12,000		67,370	25,100	6,000	
Off Chatham	17	60	457	129,200	166,840		789,760	142,140	127,465	
Nantucket Shoals	24	48	374	85,710	198,145		784,410	241,905	40,320	300
Middle Bank (Stellwagen Bank)	2	4	26	8,855	4,840		23,830	1,680	28,740	
Shore, general	26	131	419	30,275	49,320	235	359,390	100,160	59,015	2,520
Total	[1] 69	1,067	8,361	2,907,303	4,301,853	20,935	19,520,040	7,068,595	855,880	13,340

Otter trawls, small:										
Georges Bank	3	30	256	68,420	46,995		357,420	82,815	2,335	
Clark Bank	1	1	5	800	600		11,500	680	700	
South Channel	3	20	158	20,640	54,085		331,485	45,505	3,290	
Off Highland Light	1	1	7	575	275		5,500	1,475	3,900	
Shore, general	47	435	1,153	97,170	93,866	1,220	618,171	30,175	87,484	32,548
Total	[1] 48	487	1,579	187,605	195,821	1,220	1,324,076	160,650	97,709	32,548
Sink gill nets:										
Jeffreys Ledge	5	59	59	82,135	6,378		13,791		13,145	13,650
Shore, general	40	3,892	3,916	4,740,189	322,638	100	2,114,710	345	856,619	222,960
Total	[1] 40	3,951	3,975	4,822,324	329,016	100	2,128,501	345	869,764	236,610
Drift gill nets:										
Bay of Islands	3	3	237							
Jeffreys Ledge	1	1	2							
Shore, general	63	492	975	82						
Total	[1] 66	496	1,214	82						
Danish seines:										
Nantucket Shoals	1	1	14							
Shore, general	1	5	31				1,440		1,070	
Total	[1] 1	6	45				1,440		1,070	
Purse seines:										
Cape Shore	15	16	99							
Georges Bank	6	8	50							
South Channel	22	23	122	140	75					
Off Chatham	1	1	3							
Nantucket Shoals	20	23	112							
Middle Bank (Stellwagen Bank)	3	3	24							
South	39	53	198							
Shore, general	120	2,020	5,205	805	220		35			
Total	[1] 120	2,147	5,813	945	295		35			
Scallop drags:										
Nantucket Shoals	1	1	7							
Grand total	[1] 372	11,112	48,729	30,193,109	30,175,180	369,736	92,178,669	27,938,205	6,874,073	876,351

[1] Exclusive of duplication.

NOTE.—The 3 principal New England ports are Boston and Gloucester, Mass., and Portland, Maine. Otter trawls (including V-D trawls) are classified according to the size of the vessel. The weight of salted fish landed has been converted to the equivalent of fresh fish as landed. Only landings by vessels having a capacity of 5 net tons or greater are used in this tabulation. "Occasional" after the name of a bank or ground indicates that the vessel or vessels contributing to the catch as shown fished chiefly with another type of gear. In such cases the number of vessels fishing, number of trips, and number of days absent are shown under the principal types of gear used.

Landings by fishing vessels at the 3 principal New England ports, 1932—Continued

BY GEAR AND FISHING GROUNDS—Continued

Gear and fishing grounds	Pollock	Cusk	Halibut	Flounders	Swordfish	Mackerel	Herring	Other	Total
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Line trawls:									
Grand Bank	440	150	288,333						312,897
St. Peters Bank			76,837						76,837
Off Newfoundland									264,089
Seal Island Grounds	5,000	36,975	3,207					5,825	345,707
Gulf of St. Lawrence			26,382						1,274,516
Scatari Bank			60,312						142,437
Quereau Bank		9,900	383,865	14,032				2,604	590,847
The Gully			79,344						79,344
Sable Island Bank (Western Bank)	15,280	146,600	233,511					3,350	2,619,672
Cape Shore	62,305	357,340	8,064		434			21,545	3,731,621
Emerald Bank	8,350	8,900	2,769					1,400	520,794
La Have Bank	63,135	172,590	64,917					17,550	5,637,882
Roseway Bank	970	13,350	198					400	162,958
Browns Bank	247,045	1,119,620	143,465	4,898				107,267	15,964,561
Georges Bank	233,355	317,317	566,016	3,590	15,917			11,880	9,937,509
South Channel	275,475	134,580	18,396	13,870	526	2,000		26,115	9,159,832
Off Highland Light	1,115	4,960	172						85,632
Off Chatham	6,110	2,375	6,170	600				865	241,240
Nantucket Shoals	400	2,050	4,010					660	37,895
Cashes Bank	27,159	97,524	4,640					14,317	526,591
Fippenies Bank	21,025	63,895	996					970	500,506
Platts Bank	2,790	6,405	296					2,250	47,676
Jeffreys Ledge	124,383	141,902	2,281	66				67,673	1,550,648
Tillies Bank	4,100	335							19,115
Middle Bank (Stellwagen Bank)	48,735	56,365	1,130	1,780				3,844	1,128,509
Shore, general	72,610	163,296	18,946	12,613	3,679			79,877	2,307,954
Total	1,219,782	2,856,429	1,994,347	51,449	[1] 20,556	[1] 2,000		368,392	57,267,269
Hand lines:									
Gulf of St. Lawrence (occasional)						14,985			14,985
Cape Shore	12,350	4,400						5,185	148,055
Browns Bank	24,820	2,875	631					13,460	353,809
Georges Bank	94,921	3,500	4,011		135			7,443	1,070,466
Nantucket Shoals	5,040	1,100	2,216					2,255	255,921
Shore, general	591	650						75	24,926
Shore, general (occasional)	125								2,091
Total	137,838	12,525	6,858		[1] 135	[1] 14,985		28,418	1,870,253

Harpoons:									
Grand Bank (occasional)					410				410
Quereau Bank (occasional)					2,957				2,957
Cape Shore					85,329				85,329
La Have Bank (occasional)					367				367
Browns Bank					327,284				327,284
Browns Bank (occasional)					2,212				2,212
Georges Bank					1,865,816			1,137	1,866,953
Georges Bank (occasional)					54,168				54,168
South Channel (occasional)					1,233				1,233
Nantucket Shoals					83,059				83,059
Cashes Bank					11,526				11,526
South					4,047				4,047
Shore, general					128,020				128,020
Shore, general (occasional)					2,188				2,188
Total					2,568,616			1,137	2,569,753
Otter trawls, large:									
St. Peters Bank			904					2,300	135,604
Sable Island Bank (Western Bank)	629,065	9,405	49,469	152,125				283,055	11,772,676
Cape Shore	5,525	1,195	852	74,495				13,810	452,202
Emerald Bank	8,050		2,375	3,210				9,450	379,940
La Have Bank	315,515	14,555	29,737	97,775				107,661	3,745,049
Browns Bank	393,830	10,380	42,175	121,325				247,135	7,255,533
Georges Bank	2,006,460	106,935	125,963	1,436,038	145	18,180	3,500	330,729	60,614,437
South Channel	656,080	16,150	29,358	433,837		350		173,205	13,546,480
Off Highland Light	70			1,700				375	65,795
Off Chatham	6,525	50	85	12,700		1,200		8,025	294,505
Nantucket Shoals	15,380		1,299	23,275		290		2,485	823,454
Shore, general	75			7,500				950	62,025
Total	4,036,575	158,670	282,217	2,363,980	[1] 145	[1] 20,020	[1] 3,500	1,179,180	99,147,700
Otter trawls, medium:									
Sable Island Bank (Western Bank)	14,300		2,239	2,400				7,800	626,089
Cape Shore	2,275	4,800	480	3,605		100		190	130,875
La Have Bank	13,885		773	6,400				1,735	271,618
Browns Bank	79,355	5,635	7,029	35,015	2,343			43,775	1,808,797
Georges Bank	267,565	7,950	37,055	2,075,631	10,142	1,920		143,470	19,530,116
Clark Bank	375			2,000				1,165	65,500
South Channel	186,325	8,455	14,699	912,070	1,978	1,210		199,630	12,866,880
Off Highland Light	11,400		154	28,700					159,044
Off Chatham	73,585	200	966	97,863		3,790		101,565	1,633,374
Nantucket Shoals	37,615	100	787	172,965		300		11,265	1,573,822
Middle Bank (Stellwagen Bank)	9,185	6,710	80	700				80	84,700
Shore, general	12,805	1,065	644	270,130		35		25,560	911,154
Total	708,670	34,915	64,906	3,607,479	[1] 14,463	[1] 7,355		536,235	39,661,969

[1] Incidental catch.

Landings by fishing vessels at the 3 principal New England ports, 1932—Continued

BY GEAR AND FISHING GROUNDS—Continued

Gear and fishing grounds	Pollock	Cusk	Halibut	Flounders	Swordfish	Mackerel	Herring	Other	Total
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Otter trawls, small:									
Georges Bank	2,040		2,291	181,275				4,185	747,776
Clark Bank				600					14,880
South Channel	170		5,650	67,130		150		2,865	530,970
Off Highland Light	550			2,450					14,725
Shore, general	2,745	361	720	1,086,064				28,034	2,078,558
Total	5,505	361	8,661	1,337,519		[2] 150		35,084	3,386,909
Sink gill nets:									
Jeffreys Ledge	38,160	673	14	250				8,249	176,445
Shore, general	1,696,236	9,171	96	16,131				156,058	10,135,253
Total	1,734,396	9,844	110	16,381				164,307	10,311,698
Drift gill nets:									
Bay of Islands							983,550		983,550
Jeffreys Ledge						65		65	130
Shore, general						1,780,381		10,252	1,790,715
Total						1,780,446	983,550	10,317	2,774,395
Danish seines:									
Nantucket Shoals				6,425				600	7,025
Shore, general				59,600					62,110
Total				66,025				600	69,135
Purse seines:									
Cape Shore						617,015		80	617,095
Georges Bank						74,870			74,870
South Channel						159,525			159,740
Off Chatham						10,250			10,250
Nantucket Shoals						312,220			312,220
Middle Bank (Stellwagen Bank)						39,675			39,675
South						2,341,056			2,341,056
Shore, general	15,765					32,756,765	96,000	422,159	33,291,759
Total	15,765					36,311,376	96,000	422,239	36,846,655
Scallop drags:									
Nantucket Shoals								1,800	1,800
Grand total	7,858,531	3,072,744	2,357,099	7,442,833	2,603,915	38,136,332	1,083,050	2,747,709	253,907,536

SUMMARY: BY FISHING GROUNDS

Fishing grounds	Vessels fishing	Trips	Days absent	Cod			Haddock		Hake	
				Large	Market	Scrod	Large	Scrod	Large	Small
Off Newfoundland:										
Area XIX—	Number	Number	Number	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
Bay of Islands	3	3	237							
Off Newfoundland (Treaty Coast)	1	1	19	93,233	86,048	84,808				
Area XX—										
Grand Bank	3	8	197	20,269	2,228				1,477	
St. Peters Bank	4	4	73	16,200	54,700		61,500			
Total	[1] 9	16	526	129,702	142,976	84,808	61,500		1,477	
Off Canada:										
Area XIX—										
Gulf of St. Lawrence	3	5	140	431,438	660,013	156,683				
Area XXI—										
Seal Island Grounds	5	5	52	50,150	90,200		124,300	29,050	1,000	
Scatari Bank	3	3	43	67,296	14,829					
Quereau Bank	9	18	379	150,289	10,819		1,700		17,638	
The Gully	3	3	45							
Sable Island Bank (Western Bank)	59	125	1,563	2,750,367	3,063,341	13,480	7,049,945	446,380	146,325	
Cape Shore	62	122	1,390	691,598	1,152,605	2,960	1,546,455	188,230	301,955	
Emerald Bank	9	10	127	169,650	149,680		500,700	23,300	12,900	
La Have Bank	61	128	1,520	1,758,085	1,932,008	13,560	4,530,967	289,845	223,856	
Roseway Bank	3	3	33	44,910	66,240		33,690	500	2,700	
Browns Bank	124	398	4,532	4,017,056	4,001,046	5,190	13,528,295	639,505	539,530	
Total	[1] 172	820	9,824	10,130,839	11,140,781	191,873	27,316,052	1,616,810	1,245,904	
Off United States:										
Area XXII—										
Georges Bank	191	1,572	16,282	10,402,543	13,832,287	53,305	37,272,175	20,928,649	1,384,705	7,000
Clark Bank	3	3	20	3,080	3,050		48,600	16,880	4,630	
South Channel	138	760	6,142	3,505,793	3,455,415	12,080	19,461,695	4,592,485	1,877,015	19,620
Off Highland Light	11	14	104	14,895	15,410		183,770	34,355	25,120	
Off Chatham	131	83	639	164,635	200,285	1,000	1,142,860	179,090	158,575	
Nantucket Shoals	70	120	930	249,745	448,730	100	1,315,510	333,995	59,220	300
Cashes Bank	14	34	174	64,003	51,956	1,881	111,942	5,679	91,995	55,495
Fippenies Bank	12	23	118	63,515	30,155		95,540	6,075	212,260	6,075
Platts Bank	3	5	14	4,760	2,720	625	10,920	1,260	3,170	12,480
Jeffreys Ledge	30	248	512	200,166	88,890	6,160	590,427	25,964	188,095	243,740

[1] Exclusive of duplication.

Landings by fishing vessels at the 3 principal New England ports, 1932—Continued

SUMMARY: BY FISHING GROUNDS—Continued

Fishing grounds	Vessels fishing	Trips	Days absent	Cod			Haddock		Hake	
				Large	Market	Scrod	Large	Scrod	Large	Small
Off United States—Continued.										
Area XXII—Continued.	*Number*	*Number*	*Number*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Tillies Bank	2	2	6	530	350		8,850	150	4,800	
Middle Bank (Stellwagen Bank)	22	77	398	83,685	44,830		584,715	18,445	352,925	
Shore, general	250	7,281	12,838	5,175,218	717,345	17,904	3,974,113	178,368	1,264,182	531,641
Area XXIII—										
South	40	54	202							
Total	[1] 362	10,276	38,379	19,932,568	18,891,423	93,055	64,801,117	26,321,395	5,626,692	876,351
Grand total	[1] 372	11,112	48,729	30,193,109	30,175,180	369,736	92,178,669	27,938,205	6,874,073	876,351

Fishing grounds	Pollock	Cusk	Halibut	Flounders	Swordfish	Mackerel	Herring	Other	Total
Off Newfoundland:									
Area XIX—	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Bay of Islands							983,550		983,550
Off Newfoundland (Treaty Coast)									264,069
Area XX—									
Grand Bank	440	150	288,333		410				313,307
St. Peters Bank			77,741					2,300	212,441
Total	440	150	366,074		410		983,550	2,300	1,773,387
Off Canada:									
Area XIX—									
Gulf of St. Lawrence			26,382			14,985			1,289,501
Area XXI—									
Seal Island Grounds	5,000	36,975	3,207					5,825	345,707
Scatari Bank			60,312						142,437
Quereau Bank		9,900	383,865	14,032	2,957			2,604	593,804
The Gully			79,344						79,344
Sable Island Bank (Western Bank)	658,645	156,005	285,219	154,525				294,205	15,018,437
Cape Shore	82,455	367,735	9,396	78,100	85,763	617,115		40,810	5,165,177
Emerald Bank	16,400	8,900	5,144	3,210				10,850	900,734
La Have Bank	392,535	187,145	95,427	104,175	367			126,946	9,654,916

Roseway Bank	970	13,350	198					400	162,958
Browns Bank	745,050	1,138,510	193,300	161,238	331,839			411,637	25,712,196
Total	1,901,055	1,918,520	1,141,794	515,280	420,926	632,100		893,277	59,065,211
Off United States:									
Area XXII—									
Georges Bank	2,604,332	435,702	735,426	3,696,534	1,946,323	94,970	3,500	498,844	93,896,295
Clark Bank	375			2,600				1,165	80,380
South Channel	1,118,050	159,185	68,103	1,426,907	3,737	163,235		401,815	36,265,135
Off Highland Light	13,135	4,960	326	32,850				375	325,196
Off Chatham	86,220	2,625	7,221	111,163		15,240		110,455	2,179,369
Nantucket Shoals	58,435	3,250	8,312	202,665	83,059	312,810		19,065	3,095,196
Cashes Bank	27,159	97,524	4,640		11,526			14,317	538,117
Fippenies Bank	21,025	63,895	996					970	500,506
Platts Bank	2,790	6,405	296					2,250	47,676
Jeffreys Ledge	162,543	142,575	2,295	316		65		75,987	1,727,223
Tillies Bank	4,100	335							19,115
Middle Bank (Stellwagen Bank)	57,920	63,075	1,210	2,480		39,675		3,924	1,252,884
Shore, general	1,800,952	174,543	20,406	1,452,038	133,887	34,537,181	96,000	722,965	50,796,743
Area XXIII—									
South					4,047	2,341,056			2,345,103
Total	5,957,036	1,154,074	849,231	6,927,553	2,182,579	37,504,232	99,500	1,852,132	193,068,938
Grand total	7,858,531	3,072,744	2,357,099	7,442,833	2,603,915	38,136,332	1,083,050	2,747,709	253,907,536

[1] Exclusive of duplication.

NOTE.—The weight of salted fish landed has been converted to the equivalent of fresh fish as landed. The Roman numerals appearing in the stub of the above table refer to the numbers given these areas by the North American Council on Fishery Investigations.

Days' absence from port of fishing vessels landing fish at Boston and Gloucester, Mass., and Portland, Maine, 1932

Fishing grounds	January	February	March	April	May	June	July
Off Newfoundland:							
Area XIX: Bay of Islands					130		
Area XX—							
Grand Bank					61		22
St. Peters Bank		68	5				
Total		68	5		191		22
Off Canada:							
Area XIX: Gulf of St. Lawrence					26	18	44
Area XXI—							
Seal Island Grounds						52	
Scatari Bank					19	24	
Quereau Bank		7	61	92	88	48	
The Gully				34	11		
Sable Island Bank (Western Bank)	107	137	319	324	101	169	123
Cape Shore	76	29	29		48	112	9
Emerald Bank		36	45	22			
La Have Bank	306	379	128	79	74	109	96
Roseway Bank					26		
Browns Bank	689	512	557	770	479	148	252
Total	1,178	1,100	1,139	1,321	872	680	524
Off United States:							
Area XXII—							
Georges Bank	1,041	1,443	1,096	449	1,067	1,699	2,359
Clark Bank		10	10				
South Channel	204	569	673	513	330	574	398
Off Highland Light	13	14	32	4			
Off Chatham	28	48	143	61	56	30	14
Nantucket Shoals	127			34	111	166	92
Cashes Bank	21	6	6	27	26		
Fippenies Bank	35	27	8	3	7		
Platts Bank					2		
Jeffreys Ledge	130	66	21	6			
Tillies Bank	6						
Middle Bank (Stellwagen Bank)	36	88	78	12	7	20	4
Shore, general	527	580	625	819	1,017	1,241	1,433
Area XXIII: South					180	22	
Total	2,168	2,851	2,692	1,928	2,803	3,752	4,300
Grand total	3,346	4,019	3,836	3,249	3,866	4,432	4,846

Days' absence from port of fishing vessels landing fish at Boston and Gloucester, Mass., and Portland, Maine, 1932—Continued

Fishing grounds	August	September	October	November	December	Total
Off Newfoundland:						
Area XIX—						
Bay of Islands					107	237
Off Newfoundland (Treaty Coast)		19				19
Area XX—						
Grand Bank	35	24	26	29		197
St. Peters Bank						73
Total	35	43	26	29	107	526
Off Canada:						
Area XIX: Gulf of St. Lawrence		19	33			140
Area XXI—						
Seal Island Grounds						52
Scatari Bank						43
Quereau Bank	17	66				379
The Gully						45
Sable Island Bank (Western Bank)	23	56	27	13	164	1,563
Cape Shore	214	165	81	396	231	1,390
Emerald Bank				24		127
La Have Bank	30	44	31	35	209	1,520
Roseway Bank				7		33
Browns Bank	236	467	88	47	287	4,532
Total	520	817	260	522	891	9,824
Off United States:						
Area XXII—						
Georges Bank	2,349	1,776	1,252	1,145	606	16,282
Clark Bank						20
South Channel	583	595	653	438	612	6,142
Off Highland Light					41	104
Off Chatham	4	13	83	47	112	639
Nantucket Shoals	122	15	65	103	95	930
Cashes Bank	15	8	4	27	34	174
Fippenies Bank		5	5	12	16	118
Platts Bank			7	5		14
Jeffreys Ledge	4	4	66	114	101	512
Tillies Bank						6
Middle Bank (Stellwagen Bank)			21	60	72	398
Shore, general	1,644	1,597	1,529	1,034	792	12,838
Area XXIII: South						202
Total	4,721	4,013	3,685	2,985	2,481	38,379
Grand total	5,276	4,873	3,971	3,536	3,479	48,729

NOTE.—The roman numerals appearing in the stubs of the above tables refer to the numbers given these areas by the North American Council on Fishery Investigations.

MACKEREL FISHERY OF THE ATLANTIC COAST

That part of the 1932 mackerel catch taken by purse seines and drift gill nets and landed at the principal Atlantic receiving ports amounted to 46,770,749 pounds, an increase of 28 percent over the corresponding statistics for the previous year. The increase was caused by the extraordinarily large catches of young mackerel under 1 pound in weight, these blinks and tinkers accounting for more than 53 percent of the total.

Statistics on the catch by the Atlantic mackerel fleet are obtained by combining the figures of mackerel landed at Boston and Gloucester, Mass., and Portland, Maine, with those obtained by agents who in recent years have been stationed at other Atlantic ports where mackerel are landed. The figures include only the catches made by purse-seine and drift-gill-net craft and in some cases the catch by craft of less than 5 net tons capacity is not included.

Mackerel fishery of the Atlantic cost, 1932

CATCH: BY AREAS IN 5-DAY PERIODS

Date	Southern (area XXIII)		Block Island (area XXII, west of Nantucket Shoals)		Gulf of Maine (area XXII, north of Nantucket Shoals)		Cape Shore (area XXI)	Total
	Seiners	Netters	Seiners	Netters	Seiners	Netters	Seiners	
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Apr. 16-20		250						250
Apr. 21-25	529,322	47,872						577,194
Apr. 26-30	501,595	8,588						510,183
May 1-5	1,523,031	74,274						1,597,305
May 6-10	2,863,220	29,900						2,893,120
May 11-15	245,700	692						246,392
May 16-20	499,660	247,462	183,134	6,240				936,496
May 21-25		115,325	985,185	66,270				1,166,780
May 26-31	1,130	1,390	900,785	11,530	2,410			917,245
June 1-5			1,035,628	22,500	880	2,000		1,061,008
June 6-10			741,493	18,000	11,615	17,625	306,925	1,095,658
June 11-15			1,303,930	15,500	5,714	12,174	293,950	1,631,268
June 16-20			317,335	3,130	39,712	1,000	167,540	528,717
June 21-25			696,265		148,450	2,260		846,975
June 26-30					551,012	1,535		552,547
July 1-5					411,450			411,450
July 6-10					485,770	250		486,020
July 11-15					1,191,395	40,620		1,232,015
July 16-20					1,210,890	63,840		1,274,730
July 21-25					350,973	39,470		390,448
July 26-31			18,715		1,305,265	39,325		1,363,305
Aug. 1-5					1,431,628	48,870		1,480,498
Aug. 6-10					1,399,377	11,550		1,410,927
Aug. 11-15					1,053,465	3,830		1,057,295
Aug. 16-20					546,572			546,572
Aug. 21-25					1,547,745	415		1,548,160
Aug. 26-31					1,154,075			1,154,075
Sept. 1-5					662,883	300		663,183
Sept. 6-10					855,867	1,170		857,037
Sept. 11-15					1,344,191	915		1,345,106
Sept. 16-20					1,768,913	1,960		1,770,873
Sept. 21-25					1,070,259			1,070,259
Sept. 26-30					3,313,720	8,155		3,321,875
Oct. 1-5					2,911,815	3,950		2,915,765
Oct. 6-10					1,326,965	450		1,327,415
Oct. 11-15					1,112,109	1,655		1,113,764
Oct. 16-20					396,250	1,011		397,261
Oct. 21-25					1,334,474	488		1,334,962
Oct. 26-31					929,700	4,042		933,742
Nov. 1-5					627,090	30,810		657,900
Nov. 6-10					237,680	26,705		264,385
Nov. 11-15					5,400	45,020		50,420
Nov. 16-20						278,499		278,499
Nov. 21-25					4,575	443,170		447,745
Nov. 26-30					55,150	220,630		275,780
Dec. 1-5						381,085		381,085
Dec. 6-10						385,535		385,535
Dec. 11-15						55,455		55,455
Dec. 21-25						5,975		5,975
Dec. 26-30						100		100
Total	6,163,658	525,753	6,182,470	143,170	30,805,439	2,181,844	768,415	46,770,749

Mackerel fishery of the Atlantic coast, 1932—Continued

OPERATING UNITS AND CATCH: BY FLEET CLASSIFICATION AND GROUNDS

Designation	Vessels and boats	Tonnage	Crew	Trips	Total catch
SOUTHERN—AREA XXIII	*Number*	*Net tons*	*Number*	*Number*	*Pounds*
Seiners:					
Regular vessels	44	1,703	557	226	4,803,803
Miscellaneous vessels	25	898	301	56	1,359,855
Netters:					
Regular vessels	13	272	93	91	396,499
Miscellaneous vessels	5	70	29	17	78,512
Miscellaneous boats	9			21	50,742
Total	[1] 87	2,943	980	411	6,689,411
BLOCK ISLAND—AREA XXII (West of Nantucket Shoals only)					
Seiners:					
Regular vessels	51	1,980	637	267	4,986,172
Miscellaneous vessels	34	1,092	389	81	1,196,298
Netters:					
Regular vessels	5	81	37	11	71,395
Miscellaneous vessels	10	152	67	10	68,285
Miscellaneous boats	2			3	8,490
Total	[1] 100	3,305	1,130	372	6,325,640
GULF OF MAINE—AREA XXII (North of Nantucket Shoals only)					
Seiners:					
Regular vessels	58	1,955	693	1,527	24,168,341
Miscellaneous vessels	51	1,374	498	586	6,424,505
Miscellaneous boats	5			25	162,593
Netters:					
Spring and summer:					
Miscellaneous vessels	19	311	135	128	142,554
Miscellaneous boats	38			173	160,765
Fall:					
Regular vessels	30	817	229	399	1,456,939
Miscellaneous vessels	22	617	160	142	410,120
Miscellaneous boats	7			19	11,466
Total	[1] 141	5,074	1,715	2,999	32,987,288
CAPE SHORE—AREA XXI					
Seiners	19	872	242	20	768,415
Total seiners	[1] 114			2,788	43,919,982
Total netters	[1] 71			1,014	2,850,767
Grand total	[1] 150			3,802	[2] 46,770,749

[1] Exclusive of duplication and of boats.
[2] Of this total, 320,000 pounds were tacks (under ½ lb. each), 24,660,000 pounds were tinkers (½ to 1 pound each), and 21,790,000 pounds were of larger sizes (over 1 pound each). There were no bullseye mackerel landed by the fleet.

NOTE.—The Roman numerals appearing in the stub of the above table refer to the numbers given these areas by the North American Council on Fishery Investigations.

FISHERIES OF THE MIDDLE ATLANTIC STATES

(Area XXIII) [4]

The yield of the commercial fisheries in the Middle Atlantic States (New York, New Jersey, Pennsylvania, and Delaware) during 1932 amounted to 141,221,457 pounds, valued at $4,653,979 to the fishermen, representing a decrease of 7 percent in volume and 36 percent in value as compared with the catch in the previous year. In addition, there was a production of 1,331,790 bushels of seed oysters, valued at $481,013. These fisheries gave employment to 9,155 fishermen, including those in the fishery for seed oysters.

Fisheries of the Middle Atlantic States, 1932

SUMMARY OF CATCH

Product	New York		New Jersey		Pennsylvania	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Fish	53, 459, 498	$919, 599	56, 432, 759	$984, 160	31, 729	$1, 739
Shellfish, etc	11, 406, 724	1, 413, 748	16, 161, 565	1, 233, 675		
Total	64, 866, 222	2, 333, 347	72, 594, 324	2, 217, 835	31, 729	1, 739

Product	Delaware		Total	
	Pounds	*Value*	*Pounds*	*Value*
Fish	2, 377, 901	$32, 713	112, 301, 887	$1, 938, 211
Shellfish, etc	1, 350, 969	68, 341	28, 919, 258	2, 715, 764
Total	3, 728, 870	101, 054	141, 221, 145	4, 653, 975

OPERATING UNITS: BY STATES

Item	New York	New Jersey	Pennsylvania	Delaware	Total
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels	937	1, 853		72	2, 862
On boats and shore:					
Regular	1, 106	974		67	2, 147
Casual	1, 314	1, 581	51	415	3, 361
Total	3, 357	4, 408	51	554	8, 370
Vessels:					
Steam	8				8
Net tonnage	1, 600				1, 600
Motor	176	217		14	407
Net tonnage	2, 910	3, 485		221	6, 616
Total vessels	184	217		14	415
Total net tonnage	4, 510	3, 485		221	8, 216
Boats:					
Motor	438	1, 102		53	1, 593
Other	1, 173	712	12	149	2, 046
Accessory boats	48				48

[4] This is the number given to this area by the North American Council on Fishery Investigations. It should be explained that there are included in this area craft owned in the area but at times fishing elsewhere. A notable example is the southern trawl fishery which extends into area XXIV. It should be observed that the persons engaged, gear and craft employed, and catch of the seed oyster fishery are not included among the statistics of the fishery for market oysters and other species but are shown in separate tables in this section.

Fisheries of the Middle Atlantic States, 1932—Continued

OPERATING UNITS: BY STATES—Continued

Item	New York	New Jersey	Pennsylvania	Delaware	Total
Apparatus:					
Purse seines:	*Number*	*Number*	*Number*	*Number*	*Number*
Menhaden	5	2			7
Length, yards	1,680	906			2,586
Other	2	13			15
Length, yards	800	4,960			5,760
Haul seines	131	127	13	60	331
Length, yards	13,544	12,690	1,735	18,425	46,394
Gill nets:					
Anchor	115	1			116
Square yards	72,827	900			73,727
Drift	391	801		52	1,244
Square yards	428,384	599,720		136,675	1,164,779
Runaround	35	84		19	138
Square yards	124,422	247,520		27,900	399,842
Stake	42	697		162	901
Square yards	15,102	92,620		12,890	120,612
Lines:					
Hand	187	854		37	1,078
Hooks	363	11,116		74	11,553
Trawl	747	803		21	1,571
Hooks	221,920	475,100		15,300	712,320
Troll	16				16
Hooks	16				16
Trot with baits or snoods	6	4			10
Baits or snoods	5,500	3,400			8,900
Trot with hooks	22				22
Hooks	3,095				3,095
Pound nets	308	163		55	526
Floating traps	5				5
Weirs		111			111
Stop nets	20	61		35	116
Square yards	9,004	63,600		7,984	80,588
Fyke nets	1,325	1,588		187	3,100
Dip nets	15	25		21	61
Cast nets		4		1	5
Scap nets	269				269
Drag nets	52	9			61
Yards at mouth	140	18			158
Otter trawls	120	59			179
Yards at mouth	2,605	1,315			3,920
Pots:					
Crab	40	10			50
Eel	3,290	3,062		643	6,995
Lobster	17,008	27,460		185	44,653
Harpoons	24				24
Spears	92	54		6	152
Dredges:					
Clam	14	56		20	90
Yards at mouth	12	60		19	91
Crab	6	49		12	67
Yards at mouth	5	62		18	85
Mussel	2				2
Yards at mouth	2				2
Oyster	91	247		22	360
Yards at mouth	131	294		28	453
Scallop	945	10			955
Yards at mouth	877	32			909
Tongs	508	868		64	1,440
Rakes	464	462			926
Forks	265	47			312
Hoes		135			135
Gaffs				1	1

Fisheries of the Middle Atlantic States, 1932—Continued

CATCH: BY STATES

Species	New York		New Jersey		Pennsylvania		Delaware		Total	
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Albacore	8,200	$226	9,869	$99					18,069	$325
Alewives	446,483	6,359	103,227	1,182	10,000	$100	1,735,000	$7,268	2,294,710	14,909
Bluefish	913,422	49,091	3,843,594	112,983			10,262	533	4,767,278	162,607
Bonito	54,203	1,528	981,979	25,876					1,036,182	27,404
Butterfish	1,239,220	34,344	2,622,886	108,206					3,862,106	142,550
Carp	161,241	14,390	136,490	14,936	950	91	31,129	2,299	329,810	31,716
Catfish and bullheads	15,402	2,373	40,290	2,435			6,108	367	61,800	5,175
Cod	3,337,370	85,528	4,115,029	89,125			29,000	876	7,481,399	175,529
Croaker	66,830	1,393	724,142	18,150			66,140	1,503	857,112	21,046
Cusk	134,643	1,555							134,643	1,555
Drum:										
Black	118	1							118	1
Red or redfish			48,200	1,007					48,200	1,007
Eels	333,793	32,720	373,120	39,257			31,128	3,126	738,041	75,103
Flounders	7,009,587	198,731	3,354,773	111,248			11,871	719	10,376,231	310,698
Frigate mackerel			2,750	34					2,750	34
Goosefish			2,667	20					2,667	20
Grayfish	800	8	7,340	73					8,140	81
Haddock	7,612,905	206,841							7,612,905	206,841
Hake	147,039	3,400	156,040	2,004					303,079	5,404
Halibut	45,181	6,496							45,181	6,496
Herring, sea	23,721	344	615,284	3,671			17,000	300	656,005	4,315
King whiting or "kingfish"	64,889	4,337	112,767	5,608			532	33	178,188	9,978
Launce	37,118	468							37,118	468
Mackerel	373,176	15,154	367,021	12,066					740,197	27,220
Menhaden	25,493,054	43,319	17,701,033	29,721					43,194,087	73,040
Minnows			3,450	345					3,450	345
Mullet	2,141	104	28,371	1,750			184,507	1,951	215,019	3,805
Mummichog	89,470	4,380	20,905	2,349					110,375	6,729
Pigfish	537	8							537	8
Pike or pickerel	655	76							655	76
Pilotfish			1,200	35					1,200	35
Pollock	660,367	10,994	1,362	43					661,729	11,037
Pompano			200	10					200	10
Rosefish	7,426	96							7,426	96
Scup or porgy	1,074,163	20,975	6,436,097	66,436			5,400	216	7,515,660	87,627
Sea bass	479,320	20,471	2,869,462	82,554			3,900	175	3,352,682	103,200
Sea robin	14,733	266	16,828	168					31,561	434
Shad	400,595	41,259	223,934	23,556	2,029	608	16,026	2,067	642,584	67,490
Sharks	250	2	21,138	230					21,388	232

Silversides	166,690	5,358	6,071	728					172,761	6,086
Skates	15,855	188	62,950	400					78,805	588
Smelts	250	30							250	30
Snapper, red			6,250	400					6,250	400
Spanish mackerel			7,983	670					7,983	670
Spot	27,157	457	107,156	1,913			19,500	689	153,813	3,059
Squeteague or "sea trout", gray	677,057	32,720	8,304,547	172,652			105,959	5,487	9,087,563	210,859
Striped bass	31,590	4,558	11,543	2,205			8,444	1,223	51,577	7,986
Sturgeon	2,982	548	6,510	760			1,600	304	11,092	1,612
Suckers	33,915	2,560	69,150	3,808	18,750	940			121,815	7,308
Sunfish	1,868	169							1,868	169
Swordfish	69,906	8,291							69,906	8,291
Tautog	70,753	2,446	29,656	858			61,000	1,860	161,409	5,164
Thimble-eyed mackerel			67,755	768					67,755	768
Tilefish	1,870,119	50,455							1,870,119	50,455
Tomcod	23,820	695	250	3					24,070	698
Tuna or "horse mackerel"	2,950	89	56,518	2,527					59,468	2,616
Whitebait	6,760	893							6,760	893
White perch	10,250	990	215,225	11,389			27,805	1,349	253,280	13,728
Whiting	171,002	1,224	2,533,847	29,669					2,704,849	30,893
Wolffish	25,247	291							25,247	291
Yellow perch	3,275	400	5,900	233			5,590	368	14,765	1,001
Total	53,459,498	919,599	56,432,759	984,160	31,729	1,739	2,377,901	32,713	112,301,887	1,938,211
SHELLFISH, ETC.										
Crabs:										
Hard	181,688	2,121	254,274	16,966			340,625	4,937	776,587	24,024
King			3,006,417	6,375			494,800	715	3,501,217	7,090
Soft	2,381	771	59,314	6,998			23,400	3,514	85,095	11,283
Lobsters	397,081	70,157	470,130	92,755			11,050	2,763	878,261	165,675
Shrimp	111,950	24,284	5,300	2,650					117,250	26,934
Squid	824,879	10,799	1,375,591	23,530					2,200,470	34,329
Clams:										
Hard, public [1]	771,664	123,632	1,258,928	183,900			29,500	6,675	2,060,092	314,207
Hard, private [2]	113,680	23,081	97,242	17,054					210,922	40,135
Soft, public [3]	518,272	35,306	668,240	25,965					1,186,512	61,271
Soft, private [3]	9,200	900							9,200	900
Surf or skimmers	352,656	18,440	136,250	6,175					488,906	24,615
Conchs	38,520	3,080							38,520	3,080
Mussels	86,000	5,560	4,000	200			23,400	2,250	113,400	8,010
Oysters: [4]										
Market, public, spring	103,010	13,519	16,585	2,007					119,595	15,526
Market, public, fall	11,900	1,229	50,971	4,590			120,300	15,880	183,171	21,699
Market, private, spring	2,689,688	398,225	158,118	22,565					2,847,806	420,790
Market, private, fall	3,231,655	481,448	8,337,955	792,521			306,294	31,522	11,875,904	1,305,491
Periwinkles			630	18					630	18

[1] Statistics on hard clams, public, are based on yields of 8 pounds of meats to the bushel in New York, 8.89 pounds in New Jersey, and 10 pounds in Delaware.
[2] Statistics on hard clams, private, used in this table are based on yields of 8 pounds of meats to the bushel in New York and 9.34 pounds in New Jersey.
[3] Statistics on soft clams used in this table are based on yields of 16 pounds of meats to the bushel in New York and 20 pounds in New Jersey.
[4] Statistics on oysters used in this table are based on yields of 7 pounds of meats to the bushel in New York, 8.98 in New Jersey, and 6.15 pounds in Delaware.

Fisheries of the Middle Atlantic States, 1932—Continued

CATCH: BY STATES—Continued

Species	New York		New Jersey		Pennsylvania		Delaware		Total	
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Scallops:										
Bay	393,040	$41,811							393,040	$41,811
Sea	1,531,587	125,749	240,234	$14,030					1,771,821	139,779
Terrapin, diamond-back			515	180					515	180
Turtles:										
Hawksbill			3,650	76					3,650	76
Loggerhead			1,550	5					1,550	5
Snapper			1,600	160			1,600	$85	3,200	245
Bloodworms	28,981	27,366	3,505	3,774					32,486	31,140
Sandworms	8,892	6,270	10,566	11,181					19,458	17,451
Total	11,406,724	1,413,748	16,161,565	1,233,675			1,350,969	68,341	28,919,258	2,715,764
Grand total	64,866,222	2,333,347	72,594,324	2,217,835	31,729	$1,739	3,728,870	101,054	141,221,145	4,653,975

NOTE.—Of the total catch in New Jersey there were 7,000 pounds of shad, valued at $560, caught in the St. Johns River in Florida. There were also, 1,081,294 pounds of fishery products, valued at $45,302, taken in the southern trawl fishery off Maryland, Virginia, and North Carolina. Of the total catch in New York, there were 738,541 pounds of fishery products, valued at $26,853, taken in the same fishery. These products consisted principally of croaker, flounders, scup, sea bass, and gray squeteague.

Fisheries of the Middle Atlantic States, 1932—Continued

PRODUCTION OF CERTAIN SHELLFISH IN NUMBER AND BUSHELS

Product	New York		New Jersey		Delaware		Total	
	Quantity	*Value*	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
Crabs:								
Hard ... number	545,064	$2,121	762,822	$16,966	1,021,875	$4,937	2,329,761	$24,024
King ... do			801,711	6,375	131,947	715	933,658	7,090
Soft ... do	9,524	771	177,942	6,998	70,200	3,514	257,666	11,283
Clams:								
Hard, public ... bushels	96,458	123,632	141,612	183,900	2,950	6,675	241,020	314,207
Hard, private ... do	14,210	23,081	10,411	17,054			24,621	40,135
Soft, public ... do	32,392	35,306	33,412	25,965			65,804	61,271
Soft, private ... do	575	900					575	900
Surf or skimmer ... do	29,388	18,440	10,900	6,175			40,288	24,615
Conchs ... do	2,140	3,080					2,140	3,080
Mussels, sea ... do	8,600	5,560	400	200	1,800	2,250	10,800	8,010
Oysters:								
Market, public, spring ... do	14,716	13,519	1,847	2,007			16,563	15,526
Market, public, fall ... do	1,700	1,229	5,676	4,590	19,561	15,880	26,937	21,699
Market, private, spring ... do	384,241	398,225	17,608	22,565			401,849	420,790
Market, private, fall ... do	461,665	481,448	928,503	792,521	49,804	31,522	1,439,972	1,305,491
Scallops:								
Bay ... do	78,608	41,811					78,608	41,811
Sea ... do	255,264	125,749	40,039	14,030			295,303	139,779

SEED OYSTER FISHERY

Item	New York		New Jersey		Delaware		Total	
OPERATING UNITS								
Fishermen:		*Number*		*Number*		*Number*		*Number*
On vessels		26		1,645		71		1,742
On boats and shore:								
Regular		278		83		29		390
Casual		6		139		45		190
Total		310		1,867		145		2,322
Vessels:								
Motor		8				11		19
Net tonnage		74				152		226
Sail				150		2		152
Net tonnage				3,011		25		3,036
Total vessels		8		150		13		171
Total net tonnage		74		3,011		177		3,262
Boats:								
Motor		161		104		8		273
Other		9		104		63		176
Apparatus:								
Dredges		6		300		28		334
Yards at mouth		8		356		33		397
Tongs		286		181		70		537
Rakes		9		40		1		50
CATCH								
Oysters:	*Bushels*	*Value*	*Bushels*	*Value*	*Bushels*	*Value*	*Bushels*	*Value*
Seed, public, spring	33,884	$20,240	1,111,337	$380,826	105,470	$24,488	1,250,691	$425,554
Seed, public, fall	5,621	3,283	27,000	6,788	2,400	590	35,021	10,661
Seed, private, spring	21,113	19,833					21,113	19,833
Seed, private, fall	24,965	24,965					24,965	24,965
Total	85,583	68,321	1,138,337	387,614	107,870	25,078	1,331,790	481,013

NOTE.—Of the number of persons fishing for seed oysters, 298 in New York, 1,146 in New Jersey, and 93 in Delaware—a total of 1,537 are duplicated among those fishing for market oysters or other species. Similarly the following craft and gear are duplicated: 6 vessels, all the boats, 2 dredges, and all tongs and rakes in New York; 81 vessels, 99 motor boats, 100 other boats, 162 dredges, 178 tongs and 38 rakes in New Jersey; and 6 vessels, 2 motor boats, 56 other boats, 12 dredges, and 63 tongs in Delaware—a total of 93 vessels, 262 motor boats, 165 other boats, 176 dredges, 527 tongs and 47 rakes.

NEW YORK

Fisheries of New York, 1932

OPERATING UNITS: BY GEAR

Item	Purse seines		Haul seines	Gill nets				Lines				
	Menhaden	Other		Anchor	Drift	Runaround	Stake	Hand	Trawl	Troll	Trot with baits or snoods	Trot with hooks
Fishermen:	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*
On vessels	89	17	2	8	17	17		43	94			
On boats and shore:												
Regular			109	42	63	50	12	50	90	6	6	1
Casual			168	20	159	1	47	10	17	2	2	21
Total	89	17	279	70	239	68	59	103	201	8	8	22
Vessels:												
Steam												
Net tonnage												
Motor	5	2	1	4	2	6		7	14			
Net tonnage	114	41	8	28	83	62		143	270			
Total vessels	5	2	1	4	2	6		7	14			
Total net tonnage	114	41	8	28	83	62		143	270			
Boats:												
Motor			3	12		25	1	41	42	4	6	
Other			117	32	111	2	38	5	11			22
Accessory boats	14			2				1	31			
Apparatus:												
Number	5	2	131	115	391	35	42	187	747	16	6	22
Length, yards	1,680	800	13,544									
Square yards				72,827	428,384	124,422	15,102					
Yards at mouth												
Hooks, baits, or snoods								363	221,920	16	5,500	3,095

Item	Pound nets	Floating traps	Stop nets	Fyke nets	Dip nets	Scap nets	Drag nets	Other trawls	Pots			Harpoons
									Crab	Eel	Lobster	
Fishermen:	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*
On vessels	3			6				354			9	35
On boats and shore:												
Regular	125	10	5	49	11	5	22	66	4	63	167	34
Casual	7		24	52	4	263	30	11		41	33	2
Total	135	10	29	107	15	268	52	431	4	104	209	71
Vessels:												
Steam								8				
Net tonnage								1,600				
Motor	1			3				62			6	7
Net tonnage	10			22				955			40	146
Total vessels	1			3				70			6	7
Total net tonnage	10			22				2,555			40	146
Boats:												
Motor	35			15			2	50	2	28	127	17
Other	103	5	19	74	15	191		1		62	8	
Accessory boats												2
Apparatus:												
Number	308	5	20	1,325	15	269	52	120	40	3,290	17,008	24
Square yards			9,004									
Yards at mouth							140	2,605				

Fisheries of New York, 1932—Continued

OPERATING UNITS: BY GEAR—Continued

Item	Spears	Dredges: Clam	Dredges: Crab	Dredges: Mussel	Dredges: Oyster	Dredges: Scallop	Tongs	Rakes	Forks	By hand	Total, exclusive of duplication
	No.	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*
Fishermen:											
On vessels		10	2	2	193	155	47				937
On boats and shore:											
Regular	48	11			6	130	304	192	165		1,106
Casual	44	3				189	156	267	132	1	1,314
Total	92	24	2	2	199	474	507	459	297	1	3,357
Vessels:											
Steam											8
Net tonnage											1,600
Motor		5	1	1	43	30	22				176
Net tonnage		43	6	13	946	483	137				2,910
Total vessels		5	1	1	43	30	22				184
Total net tonnage		43	6	13	946	483	137				4,510
Boats:											
Motor		9			3	70	118	70			438
Other	82					162	265	352	14	1	1,173
Accessory boats											48
Apparatus:											
Number	92	14	6	2	91	945	508	464	265		
Yards at mouth		12	5	2	131	877					

CATCH: BY GEAR

Species	Purse seines: Menhaden		Purse seines: Other		Haul seines		Gill nets: Anchor	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives					213,120	$2,109		
Bluefish			23,100	$1,314	12,858	541	82,880	$5,185
Bonito					170	17		
Butterfish					25	4		
Carp					54,945	4,989	5,075	505
Catfish and bullheads					4,505	747		
Eels					13,380	1,470		
Flounders					4,000	160		
King whiting or "kingfish"					11,433	571		
Launce					1,000	17		
Mackerel					3,750	187		
Menhaden	25,245,600	$42,076						
Mummichog					44,530	2,856		
Scup or porgy			383,700	7,674	1,225	12		
Sea bass			5,500	220				
Shad					1,350	150		
Silversides					166,470	5,331		
Squeteagues or "sea trout", gray			125,100	3,773	99,157	3,457	95,256	4,705
Striped bass					5,785	954	215	44
Sturgeon					190	16	310	60
Sucker					10,030	668	200	30
Sunfish					300	28		
Tomcod					500	25		
Whitebait					6,760	893		
White perch					1,800	155	2,150	192
Yellow perch					645	73	550	55
Shrimp					41,250	8,192		
Squid					7,500	38		
Total	25,245,600	42,076	537,400	12,981	706,678	33,660	186,636	10,726

Fisheries of New York, 1932—Continued

CATCH: BY GEAR—Continued

Species	Gill nets—Continued						Lines	
	Drift		Runaround		Stake		Hand	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives	11,750	$378			5,845	$122		
Bluefish			218,400	$10,127	500	25	530,770	$29,796
Bonito			8,000	240				
Butterfish			11,000	255	300	12		
Carp	1,225	106			770	72		
Catfish and bullheads	20	3						
Cod							139,620	2,687
Eels					260	30		
Flounders							32,300	646
Haddock							1,200	24
Herring, sea			500	15				
King whiting or "kingfish"			310	31			25	2
Mackerel	152,955	2,293	62,400	4,368			2,150	108
Pike or pickerel					400	40		
Pollock							201,000	3,015
Scup or porgy							31,786	632
Sea bass							92,400	4,699
Shad	344,597	33,468			51,560	7,367		
Squeteagues or "sea trout", gray			41,105	2,514	7,900	547	5,175	297
Striped bass	1,540	258	8,250	1,070	1,910	389		
Sturgeon	1,000	197			200	39		
Suckers					1,900	150		
Tautog					300	9	23,650	716
White perch	500	25			2,175	195		
Total	513,587	36,728	349,965	18,620	74,020	9,006	1,060,076	42,622

Species	Lines—Continued							
	Trawl		Troll		Trot with baits or snoods		Trot with hooks	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Bluefish			9,200	$460				
Carp							1,905	$194
Catfish and bullheads							240	42
Cod	735,070	$17,942						
Eels	6,015	112					1,400	216
Grayfish	800	8						
Haddock	33,040	896						
Hake	2,613	59						
Pollock	300	8						
Skates	8,960	127						
Squeteagues or "sea trout", gray	72,351	3,857						
Suckers							350	35
Tilefish	1,870,119	50,455						
White perch							120	12
Crabs, hard					25,190	$229		
Total	2,729,268	73,464	9,200	460	25,190	229	4,015	499

Species	Pound nets		Floating traps		Stop nets		Fyke nets	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Albacore	8,200	$226						
Alewives					790	$20	127,750	$1,316
Bluefish	35,455	1,669						
Bonito	46,033	1,271						
Butterfish	1,216,373	33,835	9,864	$183				
Carp					37,883	3,457	9,325	688
Catfish and bullheads					475	72	7,300	1,126
Cod	2,210	47						
Eels	115,192	14,475					8,950	851
Flounders	168,517	7,954	127,152	3,726			776,985	8,619
Hake			1,235	12				
Herring, sea	23,221	329						
King whiting or "kingfish"	51,707	3,698						
Launce	36,118	451						
Mackerel	151,181	8,171	740	27				
Menhaden	247,454	1,243						

Fisheries of New York, 1932—Continued

CATCH: BY GEAR—Continued

Species	Pound nets		Floating traps		Stop nets		Fyke nets	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Mullet	91	4					2,050	100
Pike or pickerel							180	28
Pollock			1,471	16				
Scup or porgy	463,431	8,535	37,821	378				
Sea bass	15,330	845	19,568	587				
Sea robin	13,283	261	1,450	5				
Shad	2,988	259			100	15		
Sharks			250	2				
Skates			2,840	21				
Spot	27,157	457						
Squeteagues or "sea trout", gray	223,977	13,349						
Striped bass	13,485	1,759			280	60	125	24
Sturgeon			119	12	150	45	300	30
Suckers					760	55	12,538	923
Sunfish					180	12	1,080	103
Tautog	42,111	1,512	77	2			4,530	206
Tomcod							23,320	670
Tuna or "horse mackerel"	2,950	89						
White perch					175	17	2,325	296
Whiting	167,727	1,207	3,275	17				
Yellow perch							1,755	239
Crabs, hard	60,000	600					41,500	445
Squid	789,768	10,355	26,200	391				
Total	3,923,959	112,601	232,062	5,379	40,793	3,753	1,020,013	15,664

Species	Dip nets		Scap nets		Drag nets		Otter trawls	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives			87,228	$2,414				
Bluefish							259	24
Butterfish							1,658	55
Carp			50,038	4,372				
Catfish and bullheads			2,812	377				
Cod							2,460,470	64,852
Croaker							66,830	1,393
Cusk							134,643	1,555
Drum, black							118	1
Eels			280	40			1,761	39
Flounders							5,900,633	177,626
Haddock							7,578,665	205,921
Hake							143,191	3,329
Halibut							45,181	6,496
Hogfish							537	8
King whiting or "kingfish"							1,414	35
Pike or pickerel			75	8				
Pollock							457,596	7,955
Rosefish							7,426	96
Scup or porgy			390	19			155,810	3,725
Sea bass							276,522	9,020
Skates							4,055	40
Smelt			250	30				
Squeteagues or "sea trout", gray							7,036	221
Sturgeon			550	125			163	24
Suckers			8,137	699				
Sunfish			308	28				
Tautog							85	1
White perch			1,005	98				
Wolffish							25,247	291
Yellow perch			125	13				
Crabs:								
Hard	5,620	$110			40,000	$400		
Soft	2,381	771						
Lobsters							105	13
Shrimp					70,700	16,092		
Scallops, sea							27	2
Squid							1,411	15
Total	8,001	881	151,198	8,221	110,700	16,492	17,270,843	483,637

Fisheries of New York, 1932—Continued

CATCH: BY GEAR—Continued

Species	Pots						Harpoons	
	Crab		Eel		Lobster			
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Carp			75	7				
Catfish and bullheads			50	6				
Eels			154,015	12,322				
Pike or pickerel			44,940	1,524				
Sea robin					70,000	$4,200		
Skates			220	27				
Tautog							69,906	$8,291
Yellow perch			200	20				
Crabs, hard	3,650	$233			3,728	74		
Lobsters					396,976	70,144		
Conchs			14,400	400				
Total	3,650	233	213,900	14,306	470,704	74,418	69,906	8,291

Species	Spears		Dredges					
			Clam		Crab		Mussel	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Eels	32,540	$3,156						
Crabs, hard					2,000	$30		
Clams, surf or skimmer			309,876	$13,762				
Mussels, sea							80,000	$5,200
Total	32,540	3,156	309,876	13,762	2,000	30	80,000	5,200

Species	Dredges—Continued				Tongs	
	Oyster		Scallop			
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Clams:						
Hard, public					564,688	$91,026
Hard, private	43,120	$6,160			68,760	16,536
Soft, public					1,920	240
Surf or skimmer					42,780	4,678
Conchs			24,120	$2,680		
Oysters:						
Market, public, spring	85,687	12,226			10,673	1,091
Market, public, fall	700	80			9,520	1,005
Market, private, spring	2,675,478	395,617			12,950	2,500
Market, private, fall	3,216,465	478,666			13,650	2,650
Scallops:						
Bay			393,040	41,811		
Sea			1,531,560	125,747		
Total	6,021,450	892,749	1,948,720	170,238	724,941	119,726

Species	Rakes		Forks		By hand	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Clams:						
Hard, public	204,976	$32,856	2,000	$250		
Hard, private	1,800	385				
Soft, public	109,120	8,308	407,232	26,758		
Soft, private			9,200	900		
Mussels, sea			6,000	360		
Oysters:						
Market, public, spring	6,510	187			140	$15
Market, public, fall	1,680	144				
Market, private, spring	1,260	108				
Market, private, fall	1,540	132				
Bloodworms			28,981	27,366		
Sandworms			8,892	6,270		
Total	326,886	41,620	462,305	61,904	140	15

Fisheries of New York, 1932—Continued

SEED OYSTER FISHERY: BY GEAR

Item	Dredges, oyster		Tongs		Rakes		Total, exclusive of duplication	
OPERATING UNITS								
Fishermen:	*Number*		*Number*		*Number*		*Number*	
On vessels	15		11				26	
On boats and shore:								
Regular			270		8		278	
Casual			5		1		6	
Total	15		286		9		310	
Vessels:								
Motor	3		5				8	
Net tonnage	45		29				74	
Boats:								
Motor			158		3		161	
Other			3		6		9	
Apparatus:								
Number	6		286		9		301	
Yards at mouth	8						8	
CATCH								
Oysters:	*Bushels*	*Value*	*Bushels*	*Value*	*Bushels*	*Value*	*Bushels*	*Value*
Seed, public, spring			33,434	$20,060	450	$180	33,884	$20,240
Seed, public, fall			5,171	3,103	450	180	5,621	3,283
Seed, private, spring	21,113	$19,833					21,113	19,833
Seed, private, fall	24,965	24,965					24,965	24,965
Total	46,078	44,798	38,605	23,163	900	360	85,583	68,321

NOTE.—Of the number of persons fishing for seed oysters, all of those in the tong and rake fisheries, and 3 in the dredge fishery are duplicated among those in the market oyster fishery or fisheries for other species. Similarly, all the craft and gear in the tong and rake fishery are duplicated as well as 1 motor vessel, and 2 dredges in the dredge fishery.

NEW JERSEY

Fisheries of New Jersey, 1932

OPERATING UNITS: BY GEAR

Item	Purse seines		Haul seines	Gill nets				Lines		
	Menhaden	Other		Anchor	Drift	Runaround	Stake	Hand	Trawl	Trot with baits or snoods
Fishermen:	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*
On vessels	42	114			8			99	62	
On boats and shore:										
Regular			83		96	54	31	184	246	3
Casual			225	2	168	60	66	156	66	4
Total	42	114	308	2	272	114	97	439	374	7
Vessels:										
Motor	2	13			1			18	16	
Net tonnage	128	195			11			220	178	
Boats:										
Motor			22	1	106	57	39	206	145	3
Other			95		30		7	6	1	
Accessory boats		17	1					39	21	
Apparatus:										
Number	2	13	127	1	801	84	697	854	803	4
Length, yards	906	4,960	12,690							
Square yards				900	599,720	247,520	92,620			
Hooks, baits, or snoods								1,116	475,100	3,400

Fisheries of New Jersey, 1932—Continued

OPERATING UNITS: BY GEAR—Continued

Item	Pound nets	Weirs	Stop nets	Fykes	Dip nets	Cast nets	Drag nets	Otter trawls	Pots: Crab	Pots: Eel	Pots: Lobster
Fishermen:	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*
On vessels	249							142			
On boats and shore:											
Regular	115		21	53	6		4	53	1	32	176
Casual	6	24	60	83	19	4	7	10		63	56
Total	370	24	81	136	25	4	11	205	1	95	232
Vessels:											
Motor	38							30			
Net tonnage	230							637			
Boats:											
Motor	22	8	15	37	8		7	29		44	132
Other	7	5	34	46	15				1	25	
Apparatus:											
Number	163	111	61	1,588	25	4	9	59	10	3,062	27,460
Square yards			63,600								
Yards at mouth								1,316			

Item	Spears	Dredges: Clam	Dredges: Crab	Dredges: Oyster	Dredges: Scallop	Tongs	Rakes	Forks	Hoes	By hand	Total, exclusive of duplication
Fishermen:	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*
On vessels		174	16	1,217	37						1,853
On boats and shore:											
Regular	35	12	1	18		296	161	15	48	29	974
Casual	19		4	13		572	301	32	87	91	1,581
Total	54	186	21	1,248	37	868	462	47	135	120	4,408
Vessels:											
Motor		22	7	105	5						217
Net tonnage		332	67	2,073	74						3,485
Boats:											
Motor	9	6	3	19		428	229		21	25	1,102
Other	43					371	204		59	68	712
Accessory boats						8					86
Apparatus:											
Number	54	56	49	247	10	868	462	47	135		
Yards at mouth		60	62	294	32						

Fisheries of New Jersey, 1932—Continued

CATCH: BY GEAR

Species	Purse seines				Haul seines		Gill nets	
	Menhaden		Other				Anchor	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives					77,795	$882		
Bluefish			207,724	$8,949	4,200	352	2,000	$40
Bonito			1,310	42				
Butterfish			494	20				
Carp					49,690	5,391		
Catfish and bullheads					23,888	1,253		
Croaker			62,236	499	2,600	82		
Eels					46,049	3,665		
Flounders			12,618	254	29,565	1,745		
King whiting or "kingfish"					1,550	107		
Menhaden	12,945,708	$19,438	2,842,170	4,423				
Minnows					3,450	345		
Mullet					28,371	1,750		
Mummichog					7,655	980		
Scup or porgy			1,440,920	5,488				
Sea bass			31,419	880				
Shad					9,006	2,031		
Silversides					6,071	728		
Spot					150	8		
Squeteagues or "sea trout", gray			1,807,701	16,168	44,313	2,474	700	49
Striped bass					1,050	188		
Suckers					69,050	3,798		
Thimble-eyed mackerel			810	8				
Tuna or "horse mackerel"			40,000	1,000				
White perch					10,865	832		
Yellow perch					250	10		
Crabs:								
Hard					240	15		
Soft					23,194	3,303		
Total	12,945,708	19,438	6,447,402	37,731	439,002	20,939	2,700	89

Species	Gill nets—Continued						Lines	
	Drift		Runaround		Stake		Hand	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives					5,520	$181		
Bluefish	51,875	$2,402	272,412	$8,382	13,312	827	2,745,483	$75,496
Bonito	1,000	20					108,406	3,270
Butterfish	25	3	19	2				
Cod							9,617	167
Croaker	34,100	604			1,000	90	6,485	156
Eels							11,697	1,221
Flounders							23,357	908
Mackerel	176,375	5,481						
Menhaden			400	4				
Scup or porgy			231	2			28,301	597
Sea bass							313,713	10,364
Shad	44,702	6,200			115,733	7,600		
Sharks							2,000	30
Snapper, red							6,250	400
Spanish mackerel							1,250	20
Spot	200	4						
Squeteagues or "sea trout", gray	90,650	3,048	98,540	3,173	18,244	1,070	58,375	2,511
Striped bass					4,180	366	400	48
Sturgeon	573	45						
Tautog							3,700	197
Tuna or "horse mackerel"							56	2
White perch					34,650	2,876	100	4
Yellow perch							100	4
Crabs:								
Hard	800	50			360	41		
Soft					340	55		
Total	400,300	17,857	371,611	11,563	193,339	13,606	3,319,290	95,395

Fisheries of New Jersey, 1932—Continued

CATCH: BY GEAR—Continued

Species	Lines—Continued				Pound nets		Weirs	
	Trawl		Trot with baits or snoods					
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Albacore					9,869	$99		
Bluefish					541,252	16,168		
Bonito					871,263	22,544		
Butterfish					2,585,526	106,888		
Cod	3,827,022	$83,003			164,359	4,160		
Croaker					306,073	6,529		
Drum, red or redfish					48,200	1,007		
Eels					10,440	1,244		
Flounders	7,000	255			293,991	13,058		
Frigate mackerel					2,750	34		
Goosefish					2,667	20		
Grayfish					7,340	73		
Hake	24,500	704			120,340	1,081		
Herring, sea					615,284	3,671		
King whiting or "kingfish"					96,366	5,017		
Mackerel					190,646	6,585		
Menhaden					1,912,755	5,856		
Pilotfish					1,200	35		
Pollock					1,362	43		
Pompano					200	10		
Scup or porgy					3,482,395	28,409		
Sea bass					261,045	8,334		
Sea robin					16,828	168		
Shad					54,231	7,662		
Sharks					19,138	200		
Skates	800	4			62,150	396		
Spanish mackerel					6,733	650		
Spot					105,189	1,874		
Squeteagues or "sea trout", gray					6,025,103	139,194		
Striped bass					1,115	164		
Sturgeon					876	200		
Tautog					16,028	414		
Thimble-eyed mackerel					66,945	760		
Tomcod					250	3		
Tuna or "horse mackerel"					16,462	1,525		
White perch					360	22		
Whiting					2,538,727	29,068		
Crabs:								
Hard			24,000	$1,000	7,713	48		
King					1,517,250	3,209	1,437,000	$2,926
Soft			10,720	285				
Squid					1,370,196	23,396		
Turtles:								
Hawksbill					3,650	76		
Loggerhead					1,550	5		
Total	3,859,322	83,966	34,720	1,285	23,350,817	440,499	1,437,000	2,926

Species	Stop nets		Fyke nets		Dip nets		Cast nets	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives			19,912	$119			2,000	$220
Carp	84,800	$9,325						
Catfish and bullheads			16,402	1,182				
Eels			28,212	2,689				
Flounders			117,065	3,426				
Shad	262	63						
Striped bass	250	30	4,548	909				
Suckers			100	10				
White perch			169,250	7,655				
Yellow perch			5,550	219				
Crabs:								
Hard					12,300	$721		
King			14,667	160				
Soft					14,620	2,554		
Turtles, snapper			1,600	160				
Total	85,312	9,418	377,306	16,529	26,920	3,275	2,000	220

Fisheries of New Jersey, 1932—Continued

CATCH: BY GEAR—Continued

Species	Drag nets		Otter trawls		Pots			
					Crab		Eel	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Bluefish			5,336	$367				
Butterfish			36,822	1,293				
Cod			114,031	1,795				
Croaker			311,648	10,190				
Eels			3,823	77			142,190	$12,996
Flounders			2,871,177	91,602				
Hake			11,200	219				
King whiting or "kingfish"			14,851	484				
Mummichog							13,250	1,369
Scup or porgy			1,484,250	31,940				
Sea bass			820,069	25,820				
Spot			1,617	27				
Squeteagues or "sea trout," gray			160,912	4,965				
Sturgeon			5,061	515				
Tautog			2,213	47				
Whiting			120	1				
Crabs:								
Hard					8,000	$400		
Soft					3,200	600		
Lobsters			465	70				
Shrimp	5,300	$2,650						
Periwinkles			630	18				
Squid			5,395	134				
Total	5,300	2,650	5,849,620	169,564	11,200	1,000	155,440	14,365

Species	Pots—Continued		Spears		Dredges			
	Lobster				Clam		Crab	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Eels	10	$1	130,699	$17,364				
Sea bass	1,443,216	37,156						
Tautog	7,715	200						
Crabs, hard							181,101	$14,167
Lobsters	469,665	92,685						
Clams:								
Hard, public					24,321	$4,380		
Hard, private					63,158	7,101		
Surf or skimmer					136,250	6,175		
Total	1,920,606	130,042	130,699	17,364	223,729	17,656	181,101	14,167

Species	Dredges—Continued				Tongs		Rakes	
	Oyster		Scallop					
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Crabs:								
Hard					7,980	$229	11,780	$295
Soft					3,520	108	3,720	93
Clams:								
Hard, public	4,200	$552			705,753	107,798	460,006	59,345
Hard, private	18,428	4,212			8,456	2,141	7,200	3,600
Oysters:								
Market, public, spring					13,035	1,507	3,550	500
Market, public, fall					49,398	4,405	1,573	185
Market, private, spring	92,625	13,452			58,854	7,886	4,089	777
Market, private, fall	8,180,907	770,620			117,955	15,776	38,668	6,075
Scallops, sea			240,234	$14,030				
Total	8,296,160	788,836	240,234	14,030	964,951	139,850	530,586	70,870

Fisheries of New Jersey, 1932—Continued

CATCH: BY GEAR—Continued

Species	Forks		Hoes		By hand	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Crabs, king					37,500	$80
Clams:						
Hard, public					64,648	11,825
Soft, public			668,240	$25,965		
Mussels, sea					4,000	200
Oysters:						
Market, private, spring					2,550	450
Market, private, fall					425	50
Terrapin, diamond-back					515	180
Bloodworms	3,505	$3,774				
Sandworms	10,566	11,181				
Total	14,071	14,955	668,240	25,965	109,638	12,785

SEED OYSTER FISHERY: BY GEAR

Item	Dredges, oyster		Tongs		Rakes		Total, exclusive of duplication	
OPERATING UNITS								
Fishermen:	*Number*		*Number*		*Number*		*Number*	
On vessels	1,645						1,645	
On boats and shore:								
Regular			65		18		83	
Casual			116		23		139	
Total	1,645		181		41		1,867	
Vessels:								
Sail	150						150	
Net tonnage	3,011						3,011	
Boats:								
Motor			71		33		104	
Other			97		7		104	
Apparatus:								
Number	300		181		40		521	
Yards at mouth	356						356	
CATCH	*Bushels*	*Value*	*Bushels*	*Value*	*Bushels*	*Value*	*Bushels*	*Value*
Oysters:								
Seed, public, spring	1,033,400	$362,040	69,502	$16,927	8,435	$1,859	1,111,337	$380,826
Seed, public, fall			26,750	6,688	250	100	27,000	6,788
Total	1,033,400	362,040	96,252	23,615	8,685	1,959	1,138,337	387,614

NOTE.—Of the number of persons fishing for seed oysters, 929 in the dredge fishery, 178 in the tong fishery, and 39 in the rake fishery are duplicated among those fishing for market oysters or in fisheries for other species. Similarly, 81 vessels, and 162 dredges in the dredge fishery; 68 motor boats, all the other boats and 178 tongs in the fishery with tongs; and 31 motor boats, 3 other boats, and 38 rakes in the fishery by rakes are duplicated.

PENNSYLVANIA

Fisheries of Pennsylvania, 1932 [1]

OPERATING UNITS: BY GEAR

Item	Haul seines
	Number
Fishermen, on boats and shore, casual	51
Boats:	
Other	12
Apparatus:	
Number	13
Length, yards	1,735

[1] The fisheries of Pennsylvania are confined to Bucks County.

Fisheries of Pennsylvania, 1932—Continued

CATCH: BY GEAR

Species	Haul seines	
	Pounds	*Value*
Alewives	10,000	$100
Carp	950	91
Shad	2,029	608
Suckers	18,750	940
Total	31,729	1,739

DELAWARE

Fisheries of Delaware, 1932

OPERATING UNITS: BY GEAR

Item	Haul seines	Gill nets			Lines		Pound nets
		Drift	Run-around	Stake	Hand	Trawl	
Fishermen:							
On boats and shore:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Regular	12	10	12	17	23	5	2
Casual	240	62	19	30	9	9	33
Total	252	72	31	47	32	14	35
Boats:							
Motor		26	13	4	9	5	
Other	64	10	3	18	4	1	19
Accessory boats	1			1			1
Apparatus:							
Number	60	52	19	162	37	21	55
Length, yards	18,425						
Square yards		136,675	27,900	12,890			
Hooks, baits, or snoods					74	15,300	

Item	Stop nets	Fyke nets	Dip nets	Cast nets	Pots		Spears
					Eel	Lobster	
Fishermen:							
On boats and shore:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Regular	2	13	10		14	13	
Casual	37	23	11	1	14		6
Total	39	36	21	1	28	13	6
Boats:							
Motor		6			2	4	2
Other	19	15	11		13		3
Accessory boats	1						
Apparatus:							
Number	35	187	21	1	643	185	6
Square yards	7,984						

Fisheries of Delaware, 1932—Continued

OPERATING UNITS: BY GEAR—Continued

Item	Dredges: Clam	Dredges: Crab	Dredges: Oyster	Tongs	Gaffs	By hand	Total, exclusive of duplication
	Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Fishermen:							
On vessels	11	19	63				72
On boats and shore:							
Regular	7			26			67
Casual	4			38	1	12	415
Total	22	19	63	64	1	12	554
Vessels:							
Motor	4	6	11				14
Net tonnage	64	108	165				221
Boats:							
Motor	6			2			53
Other				56			149
Accessory boats				9			13
Apparatus:							
Number	20	12	22	64	1		
Yards at mouth	19	18	28				

CATCH: BY GEAR

Species	Haul seines: Pounds	Haul seines: Value	Gill nets, Drift: Pounds	Gill nets, Drift: Value	Gill nets, Runaround: Pounds	Gill nets, Runaround: Value	Gill nets, Stake: Pounds	Gill nets, Stake: Value
Alewives	1,361,700	$3,910	44,100	$409			280,650	$2,053
Bluefish			8,625	448			665	27
Carp	12,350	809						
Catfish and bullheads	1,775	122					13	1
Croaker	23,045	460	20,900	350	1,524	$25		
Eels	510	63						
Flounders	1,300	78					9,337	561
Herring, sea	17,000	300						
King whiting or "kingfish"	532	33						
Mullet					184,500	1,950	7	1
Shad	5,616	728	10,300	1,327			110	12
Spot			19,500	689				
Squeteagues or "sea trout", gray	56,600	2,547	25,600	1,181	198	10	8,150	425
Striped bass	1,222	150					7,012	1,030
Sturgeon			1,600	304				
White perch	10,852	527					8,464	384
Yellow perch	4,245	281						
Total	1,496,747	10,008	130,625	4,708	186,222	1,985	314,398	4,494

Fisheries of Delaware, 1932—Continued

CATCH: BY GEAR—Continued

Species	Lines				Pound nets		Stop nets	
	Hand		Trawl					
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives					30,000	$550		
Bluefish	972	$58						
Carp					1,203	93	17,050	$1,372
Catfish and bullheads					3,000	183	272	11
Cod			29,000	$876				
Croaker	20,671	668						
Eels					1,571	156		
Flounders					125	12		
Scup or porgy	5,400	216						
Sea bass	3,900	175						
Squeteagues or "sea trout", gray	15,411	1,324						
Striped bass					20	5		
Tautog	61,000	1,860						
White perch					3,029	159		
Yellow perch					320	17	160	11
Crabs, king					439,800	632		
Total	107,354	4,301	29,000	876	479,068	1,807	17,482	1,394

Species	Fyke nets		Dip nets		Cast nets		Pots	
							Eel	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives	18,550	$346						
Carp	126	5			100	$8		
Catfish and bullheads	868	38						
Eels	2,323	225					26,544	$2,669
Flounders	1,109	68						
Striped bass	190	38						
White perch	5,470	279						
Yellow perch	865	59						
Crabs, soft			23,400	$3,514				
Turtles, snapper	1,500	80						
Total	31,001	1,138	23,400	3,514	100	8	26,544	2,669

Species	Pots—Con.		Spears		Dredges			
	Lobster				Clam		Crab	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Carp			300	$12				
Catfish and bulheads			180	12				
Eels			180	18				
Crabs, hard							262,500	$4,000
Lobsters	11,050	$2,763						
Clams, hard, public					18,500	$4,375	2,000	500
Total	11,050	2,763	660	37	18,500	4,375	264,500	4,500

Species	Dredges—Con.		Tongs		Gaffs		By hand	
	Oyster							
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Crabs:								
Hard	78,125	$937						
King							55,000	$83
Clams, hard, public			9,000	$1,800				
Mussels, sea			23,400	2,250				
Oysters:								
Market, public, fall			120,300	15,880				
Market, private, fall	301,374	30,892	4,920	630				
Turtles, snapper					100	$5		
Total	379,499	31,829	157,620	20,560	100	5	55,000	83

Fisheries of Delaware, 1932—Continued

SEED OYSTER FISHERY: BY GEAR

Item	Dredges, oyster		Tongs		Rakes		Total, exclusive of duplication	
OPERATING UNITS								
Fishermen:	*Number*		*Number*		*Number*		*Number*	
On vessels	71						71	
On boats and shore:								
Regular	3		25		1		29	
Casual			45				45	
Total	74		70		1		145	
Vessels:								
Motor	11						11	
Net tonnage	152						152	
Sail	2						2	
Net tonnage	25						25	
Total vessels	13						13	
Total net tonnage	177						177	
Boats:								
Motor	1		7				8	
Other			62		1		63	
Apparatus:								
Number	28		70		1		99	
Yards at mouth	33						33	
CATCH								
Oysters:	*Bushels*	*Value*	*Bushels*	*Value*	*Bushels*	*Value*	*Bushels*	*Value*
Seed, public, spring	76,050	$17,698	28,920	$6,690	500	$100	105,470	$24,488
Seed, public, fall			2,400	590			2,400	590
Total	76,050	17,698	31,320	7,280	500	100	107,870	25,078

NOTE.—Of the number of persons fishing for seed oysters, 29 in the dredge fishery, 63 in the fishery by tongs, and the 1 person in the rake fishery are duplicated among those in the market oyster fishery or in fisheries for other species. Similarly, 4 motor vessels, all the sail vessels, and 12 dredges in the dredge fishery; and 2 motor boats, 56 other boats, and 63 tongs in the fishery by tongs are duplicated.

VESSEL FISHERIES AT NEW YORK CITY AND GROTON, CONN.[5]

During 1932 fishing vessels of 5 net tons capacity or greater landed 35,601,941 pounds of fishery products at New York City and Groton, Conn. This is 31 percent less than during the previous year. The landings consisted of bluefish, 1,752,250 pounds; cod, 1,773,998 pounds; flounders, 7,797,021 pounds; haddock, 17,135,977 pounds; hake, 47,085 pounds; halibut, 1,916 pounds; mackerel, 2,565,000 pounds; pollock, 118,043 pounds; scup or porgies, and sea bass, 708,200 pounds; tilefish, 1,875,800 pounds; scallops, 1,725,845 pounds; and miscellaneous species 100,806 pounds.

It is estimated that during the year there were approximately 15,000,000 pounds of fish and shellfish landed at New York City by craft under 5 net tons.

SHAD FISHERY OF THE HUDSON RIVER

The shad fishery of the Hudson River in 1932 was prosecuted by 274 fishermen, who used 3 motor boats, 129 other boats, 110 drift gill nets, having a total area of 376,884 square yards, 16 stake gill nets, having a total area of 18,748 square yards, and 2 haul seines

[5] Statistics on the landings at New York City are collected by J. H. Matthews, executive secretary, Middle Atlantic Fisheries Association, and forwarded to this Bureau where they are combined with Groton landings. The statistics for the two ports are combined to avoid disclosure of individual enterprise.

having a combined length of 277 yards. The total catch was 159,358 shad, having a weight of 529,754 pounds, and a value to the fishermen of $50,849. This is an increase of slightly over 26 percent in number and 2 percent in value as compared with 1931. The average price per pound received by the fishermen in 1932 was about 10 cents, as compared with 12 cents in 1931.

Nearly 66 percent of the shad in weight were taken in drift gill nets and 34 percent in stake gill nets. Small quantities amounting to less than one-half of 1 percent of the total were taken by haul seines, and incidentally with gear being fished primarily for other species.

With the exception of some fishing with stake gill nets from one town in New Jersey, the fishery was prosecuted entirely from points in New York.

Shad fishery of the Hudson River, 1932

Item	New York			New Jersey			Total		
	Number	*Pounds*	*Value*	*Number*	*Pounds*	*Value*	*Number*	*Pounds*	*Value*
Fishermen:									
On boats and shore:									
Regular	54			4			58		
Casual	191			25			216		
Total	245			29			274		
Boats:									
Motor				3			3		
Other	122			7			129		
Apparatus:									
Haul seines	2						2		
Length, yards	277						277		
Gill nets:									
Drift	110						110		
Square yards	376,884						376,884		
Stake	10			6			16		
Square yards	9,072			9,676			18,748		
Shad caught:									
With haul seines	535	1,350	$150				535	1,350	$150
With drift gill nets	107,753	347,354	33,468				107,753	347,354	33,468
With stake gill nets	13,032	48,950	6,454	38,000	132,000	$10,762	51,032	180,950	17,216
Incidentally	38	100	15				38	100	15
Total	121,358	397,754	40,087	38,000	132,000	10,762	159,358	529,754	50,849

FISHERIES OF THE CHESAPEAKE BAY STATES

(Area XXIII [6])

The yield of the commercial fisheries in the Chesapeake Bay States (Maryland and Virginia) during 1932 amounted to 359,007,494 pounds, valued at $5,904,989 to the fisherman, representing an increase of 26 percent in volume but a decrease of 18 percent in value as compared with the catch in the previous year. In addition, there was a production of 1,475,053 bushels of seed oysters, valued at $158,640. These fisheries gave employment to 21,084 fishermen, including those in the fishery for seed oysters.

[6] This is the number given to this area by the North American Council on Fishery Investigations. It should be explained that there are included under this area craft owned in the area but at times fishing elsewhere. A notable example is the southern trawl fishery, which extends into area XXIV. Data on the operating units and catch of the fisheries of the Chesapeake Bay States have been taken largely from statistics collected by the State fishery agencies of Maryland and Virginia. Supplementary surveys, compilations, and analyses have been made by agents of this Bureau in order that the figures may be presented in a manner comparable with those of other sections. It should be observed that the persons engaged, gear and craft employed, and catch of the seed-oyster fishery are not included among the statistics of the fishery for market oysters and other species but are shown in separate tables in this section.

Fisheries of the Chesapeake Bay States, 1932

SUMMARY OF CATCH

Product	Maryland		Virginia		Total	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Fish	15,667,697	$473,406	251,439,634	$2,074,917	267,107,331	$2,548,323
Shellfish, etc	45,958,756	1,466,310	45,941,407	1,890,356	91,900,163	3,356,666
Total	61,626,453	1,939,716	297,381,041	3,965,273	359,007,494	5,904,989

OPERATING UNITS: BY STATES

Item	Maryland	Virginia	Total
Fishermen:	*Number*	*Number*	*Number*
On vessels	767	1,289	2,056
On boats and shore:			
Regular	5,628	6,613	12,241
Casual	2,422	4,227	6,649
Total	8,817	12,129	20,946
Vessels:			
Steam		19	19
Net tonnage		2,021	2,021
Motor	1	109	110
Net tonnage	9	1,759	1,768
Sail	187	6	193
Net tonnage	1,966	39	2,005
Total vessels	188	134	322
Total net tonnage	1,975	3,819	5,794
Boats:			
Motor	3,721	4,495	8,216
Other	2,329	3,685	6,014
Accessory boats		52	52
Apparatus:			
Purse seines:			
Menhaden		26	26
Length, yards		7,860	7,860
Other		1	1
Length, yards		300	300
Haul seines	211	91	302
Length, yards	26,946	24,223	51,169
Gill nets:			
Anchor	29		29
Square yards	12,274		12,274
Drift	158	457	615
Square yards	317,040	424,443	741,483
Stake	3,345	7,822	11,167
Square yards	249,499	358,317	607,816
Lines:			
Hand	16		16
Hooks	64		64
Trot with baits or snoods	1,227	994	2,221
Baits or snoods	792,870	580,885	1,372,755
Pound nets	655	2,019	2,674
Stop nets	3	4	7
Square yards	5,400	9,450	14,850
Fyke nets	1,183	690	1,873
Dip nets	1,523	1,349	2,872
Otter trawls		27	27
Yards at mouth		769	769
Pots, eel	9,940	14	9,954
Scrapes	956	80	1,036
Yards at mouth	956	80	1,036
Dredges:			
Crab		126	126
Yards at mouth		251	251
Oyster	538	256	794
Yards at mouth	650	347	997
Scallop		610	610
Yards at mouth		407	407
Tongs	4,962	5,641	10,603
Rakes	98	894	992
Picks		726	726

Fisheries of the Chesapeake Bay States, 1932—Continued

CATCH: BY STATES

Species	Maryland		Virginia		Total	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
FISH						
Alewives	7,552,695	$52,361	13,852,493	$64,521	21,405,188	$116,882
Black bass	33,658	3,600			33,658	3,600
Bluefish	360,129	20,649	550,739	25,490	910,868	46,139
Bonito	5,120	226	50,420	2,321	55,540	2,547
Butterfish	990,424	30,304	2,906,623	84,189	3,897,047	114,493
Cabio or crab eater	2,000	50	2,515	50	4,515	100
Carp	123,050	9,148	240,146	10,335	363,196	19,483
Catfish and bullheads	186,747	6,601	695,857	21,200	882,604	27,801
Cod			21,950	521	21,950	521
Croaker	1,321,621	26,954	14,692,706	251,539	16,014,327	278,493
Drum:						
Black	34,204	344	29,362	297	63,566	641
Red or redfish	13,670	358	25,259	822	38,929	1,180
Eels	308,536	19,547	26,326	1,374	334,862	20,921
Flounders	97,990	4,386	1,190,389	48,385	1,288,379	52,771
Gizzard shad	14,339	289	90,734	1,813	105,073	2,102
Haddock			460	10	460	10
Hake			31,084	574	31,084	574
Harvestfish	7,690	568	93,988	2,369	101,678	2,937
Hickory shad	10,668	492	48,311	970	58,979	1,462
King whiting or "kingfish"	6,200	248	26,930	955	33,130	1,203
Mackerel	2,500	125	23,517	1,136	26,017	1,261
Menhaden			195,485,600	652,536	195,485,600	652,536
Mullet	15,765	783	32,314	1,196	48,079	1,979
Pigfish			33,457	1,256	33,457	1,256
Pike or pickerel	18,073	2,978			18,073	2,978
Pompano	490	112			490	112
Scup	35,900	1,523	1,711,820	45,457	1,747,720	46,980
Sea bass	119,060	3,584	840,864	24,370	959,924	27,954
Sea robin	475	5			475	5
Shad	1,667,452	155,535	4,847,487	424,316	6,514,939	579,851
Silver perch	21,300	439			21,300	439
Skates	1,225	15			1,225	15
Spanish mackerel			62,834	3,849	62,834	3,849
Spot	47,377	1,498	753,318	22,264	800,695	23,762
Squeteagues or "sea trout":						
Gray	1,805,364	52,377	11,974,271	286,927	13,779,635	339,304
Spotted	4,060	432	84,487	5,501	88,547	5,933
Striped bass	433,811	56,300	594,299	71,455	1,028,110	127,755
Sturgeon	210	52	4,832	795	5,042	847
Suckers	1,500	47			1,500	47
Tautog	175	4	232	7	407	11
Thimble-eyed mackerel			11,619	232	11,619	232
White perch	323,808	14,737	318,191	11,516	641,999	26,253
Yellow perch	100,411	6,735	84,200	4,369	184,611	11,104
Total	15,667,697	473,406	251,439,634	2,074,917	267,107,331	2,548,323
SHELLFISH, ETC.						
Crabs:						
Hard	29,399,178	291,130	27,024,045	290,821	56,423,223	581,951
Soft	3,540,253	227,674	1,549,061	91,810	5,089,314	319,484
Lobsters			33	6	33	6
Squid	2,200	66	320,954	6,387	323,154	6,453
Clams, hard, public	27,048	4,734	1,484,464	347,647	1,511,512	352,381
Oysters: [1]						
Market, public, spring	4,343,805	335,021	1,614,674	112,094	5,958,479	447,115
Market, public, fall	7,762,740	523,540	4,446,419	280,271	12,209,159	803,811
Market, private, spring	610,888	59,277	3,420,102	274,804	4,030,990	334,081
Market, private, fall	267,925	24,005	5,423,053	406,423	5,690,978	430,428
Scallops:						
Bay			658,584	80,090	658,584	80,090
Sea			18	3	18	3
Terrapin, diamond-back	3,378	823			3,378	823
Turtles, snapper	1,341	40			1,341	40
Total	45,958,756	1,466,310	45,941,407	1,890,356	91,900,163	3,356,666
Grand total	61,626,453	1,939,716	297,381,041	3,965,273	359,007,494	5,904,989

[1] Statistics on oysters used in this table are based on yields of 6.66 pounds of meats to the bushel for market oysters in Maryland and 6.51 pounds in Virginia.

Fisheries of the Chesapeake Bay States, 1932—Continued

PRODUCTION OF CERTAIN SHELLFISH IN NUMBER AND BUSHELS

Product	Maryland		Virginia		Total	
	Quantity	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
Crabs:						
Hard.....number..	88, 197, 534	$291, 130	81, 072, 135	$290, 821	169, 269, 669	$581, 951
Soft.....do....	14, 161, 012	227, 674	6, 196, 244	91, 810	20, 357, 256	319, 484
Clams, hard.....bushels..	3, 381	4, 734	185, 558	347, 647	188, 939	352, 381
Oysters:						
Market, public, spring.....do....	652, 419	335, 021	248, 030	112, 094	900, 449	447, 115
Market, public, fall.....do....	1, 165, 927	523, 540	683, 014	280, 271	1, 848, 941	803, 811
Market, private, spring.....do....	91, 752	59, 277	525, 361	274, 804	617, 113	334, 081
Market, private, fall.....do....	40, 241	24, 005	833, 034	406, 423	873, 275	430, 428
Scallops:						
Bay.....do....			109, 764	80, 090	109, 764	80, 090
Sea.....do....			3	3	3	3

SEED OYSTER FISHERY

Item	Maryland		Virginia		Total	
OPERATING UNITS						
Fishermen:						
On boats and shore:	*Number*		*Number*		*Number*	
Regular.....	126		1, 174		1, 300	
Casual.....			447		447	
Total.....	126		1, 621		1, 747	
Boats:						
Motor.....	58		688		746	
Other.....			184		184	
Apparatus:						
Tongs.....	126		1, 265		1, 391	
Rakes.....			86		86	
CATCH						
Oysters:	*Bushels*	*Value*	*Bushels*	*Value*	*Bushels*	*Value*
Seed, public, spring.....	7, 043	$1, 056	557, 962	$67, 519	565, 005	$68, 575
Seed, public, fall.....			897, 048	89, 025	897, 048	89, 025
Seed, private, spring.....			13, 000	1, 040	13, 000	1, 040
Total.....	7, 043	1, 056	1, 468, 010	157, 584	1, 475, 053	158, 640

NOTE.—Of the number of persons fishing for seed oysters, all of those in Maryland and 1,483 in Virginia—a total of 1,609 are duplicated among those fishing for market oysters or other species. Similarly the following craft and gear are duplicated: All craft and gear in Maryland and 634 motor boats, 172 other boats, 1,165 tongs, and 86 rakes in Virginia—a total of 692 motor boats, 172 other boats, 1,291 tongs, and 86 rakes.

MARYLAND

Fisheries of Maryland, 1932

OPERATING UNITS: BY GEAR

Item	Haul seines	Gill nets: Anchor	Gill nets: Drift	Gill nets: Stake	Lines: Hand	Lines: Trot with baits or snoods	Pound nets	Stop nets	Fyke nets
Fishermen:									
On boats and shore:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Regular.....	185	6	55	107	16	983	544	4	63
Casual.....	333	8	226	94		268	101	3	41
Total.....	518	14	281	201	16	1, 251	645	7	104
Boats:									
Motor.....	95	6	85	87	8	1, 079	216	3	41
Other.....	229	6	71	69		138	175	3	57
Apparatus:									
Number.....	211	29	168	3, 345	16	1, 227	655	3	1, 183
Length, yards.....	26, 946								
Square yards.....		12, 274	317, 040	249, 499				5, 400	
Hooks, baits, or snoods..					64	792, 370			

Fisheries of Maryland, 1932—Continued

OPERATING UNITS: BY GEAR—Continued

Item	Dip nets	Pots, eel	Scrapes	Dredges, oyster	Tongs	Rakes	By hand	Total exclusive of duplication
	Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Fishermen:								
On vessels				767				767
On boats and shore:								
Regular	840	134	431	190	3,893	84	29	5,628
Casual	683	48			1,073	14	8	2,422
Total	1,523	182	431	957	4,966	98	37	8,817
Vessels:								
Motor				1				1
Net tonnage				9				9
Sail				187				187
Net tonnage				1,966				1,966
Total vessels				188				188
Total net tonnage				1,975				1,975
Boats:								
Motor	358	130		31	2,477	5		3,721
Other	1,262	38	369	50	206	93	37	2,329
Apparatus:								
Number	1,523	9,940	956	538	4,962	98		
Yards at mouth			956	650				

CATCH: BY GEAR

Species	Haul seines		Gill nets					
			Anchor		Drift		Stake	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives	378,424	$3,369	200	$4	400	$9	33,205	$468
Black bass	23,381	2,382						
Bluefish	68,106	4,668	4,200	336	8,668	593	4,916	319
Butterfish	5,000	200						
Carp	101,821	7,761					250	14
Catfish and bullheads	61,524	2,235	300	15			3,480	146
Croaker	281,930	5,645					7,000	155
Drum, red or redfish	500	19						
Eels	1,908	107						
Flounders	2,520	120						
Gizzard shad	800	13						
Mullet	641	23					14,112	706
Pike or pickerel	13,148	2,026					225	34
Shad	52,987	2,785			384,785	30,353	304,208	21,980
Silver perch	1,300	39						
Spot	3,834	140					1,020	41
Squeteagues or "sea trout":								
Gray	82,058	3,808	800	40	800	48	2,350	102
Spotted	1,600	176						
Striped bass	99,360	13,026	18,750	2,280	77,473	10,167	76,715	10,100
Suckers	1,200	38						
White perch	80,325	3,171	2,005	128	3,000	171	7,030	431
Yellow perch	23,742	1,680			600	36	4,835	274
Crabs, soft	151,083	13,459						
Turtles, snapper	1,341	40						
Total	1,438,533	66,930	26,255	2,803	475,726	41,377	459,346	34,770

Fisheries of Maryland, 1932—Continued

CATCH: BY GEAR—Continued

Species	Lines				Pound nets		Stop nets	
	Hand		Trot with baits or snoods					
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives					7,137,301	$48,469		
Black bass					3,187	389		
Bluefish	98,600	$5,916			174,689	8,740		
Bonito	3,820	161			1,300	65		
Butterfish					985,424	30,104		
Cabio or crab eater					2,000	50		
Carp					12,363	693	4,678	$414
Catfish and bullheads					70,051	2,328		
Croaker	1,000	20			1,026,611	21,032		
Drum:								
Black					34,204	344		
Red or redfish					13,170	339		
Eels					20,007	1,211		
Flounders	1,600	80			93,670	4,174		
Gizzard shad					13,539	276		
Harvestfish					7,690	568		
Hickory shad					10,668	492		
King whiting or "kingfish"					6,200	248		
Mackerel					2,500	125		
Mullet					669	33		
Pike or pickerel					686	115		
Pompano					490	112		
Scup	17,500	787			18,400	736		
Sea bass	116,200	3,466			2,860	98		
Sea robin					475	5		
Shad					925,292	100,385		
Silver perch					20,000	400		
Skates					1,225	15		
Spot					42,523	1,317		
Squeteagues or "sea trout":								
Gray	13,500	405			1,704,756	47,924		
Spotted					2,460	256		
Striped bass					160,600	20,601		
Sturgeon					210	52		
Suckers					200	6		
Tautog					175	4		
White perch					196,303	9,015		
Yellow perch					11,287	624		
Crabs:								
Hard			27,071,510	$263,488				
Soft			16,625	1,156				
Squid					2,200	66		
Total	252,220	10,855	27,088,135	264,644	12,705,385	301,411	4,678	414

Species	Fyke nets		Dip nets		Pots, eel		Scrapes	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives	3,165	$42						
Black bass	7,009	829						
Bluefish	950	77						
Carp	3,938	266						
Catfish and bullheads	51,392	1,877						
Croaker	5,080	102						
Eels	2,708	195			283,913	$18,034		
Flounders	200	12						
Mullet	343	21						
Pike or pickerel	4,014	803						
Shad	180	32						
Squeteagues or "sea trout", gray	1,100	50						
Striped bass	913	126						
Suckers	100	3						
White perch	35,145	1,821						
Yellow perch	59,947	4,121						
Crabs:								
Hard			1,668,980	$19,444			658,688	$8,198
Soft			2,741,335	178,187			631,210	34,872
Total	176,265	10,377	4,410,315	197,631	283,913	18,034	1,289,898	43,070

Fisheries of Maryland, 1932—Continued

CATCH: BY GEAR—Continued

Species	Dredges, oyster		Tongs		Rakes		By hand	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Clams, hard, public			13,528	$2,368	10,800	$1,890	2,720	$476
Oysters:								
Market, public, spring	768,935	$56,061	3,574,870	278,960				
Market, public, fall	1,662,240	98,405	6,100,500	425,135				
Market, private, spring	151,472	16,124	459,416	43,153				
Market, private, fall	77,833	8,352	190,092	15,653				
Terrapin, diamond-back							3,378	823
Total	2,660,480	178,942	10,338,406	765,269	10,800	1,890	6,098	1,299

SEED OYSTER FISHERY: BY GEAR

Item	Tongs	
OPERATING UNITS	*Number*	
Fishermen, on boats and shore—Regular	126	
Boats—Motor	58	
Apparatus—Number	126	
CATCH	*Bushels*	*Value*
Oysters, seed, public, spring	7,043	$1,056

NOTE.—The seed oyster fishery in Maryland is confined to Kent County. All fishermen, craft, and gear are duplicated among those used in the market oyster fishery or fisheries for other species.

VIRGINIA

Fisheries of Virginia, 1932

OPERATING UNITS: BY GEAR

Item	Purse seines		Haul seines	Gill nets		Lines, trot with baits or snoods	Pound nets
	Menhaden	Other		Drift	Stake		
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels	873	7					
On boats and shore:							
Regular			214	119	141	922	1,688
Casual			159	591	146	72	470
Total	873	7	373	710	287	994	2,158
Vessels:							
Steam	19						
Net tonnage	2,021						
Motor	7	1					
Net tonnage	627	9					
Total vessels	26	1					
Total net tonnage	2,648	9					
Boats:							
Motor			71	74	137	734	620
Other			103	383	62	260	664
Accessory boats	52						
Apparatus:							
Number	26	1	91	457	7,822	994	2,019
Length, yards	7,860	300	24,223				
Square yards				424,443	358,317		
Hooks, baits, or snoods						580,385	

Fisheries of Virginia, 1932—Continued

OPERATING UNITS: BY GEAR—Continued

Item	Stop nets	Fyke nets	Dip nets	Otter trawls	Pots, eel	Scrapes
	Number	*Number*	*Number*	*Number*	*Number*	*Number*
Fishermen:						
On vessels				116		
On boats and shore:						
Regular	5	71	343		2	50
Casual	4	77	1,006			
Total	9	148	1,349	116	2	50
Vessels:						
Motor				27		
Net tonnage				405		
Boats:						
Motor	4	50	162			
Other	4	68	988		2	30
Apparatus:						
Number	4	690	1,349	27	14	80
Square yards	9,450					
Yards at mouth				769		80

Item	Dredges: Crab	Dredges: Oyster	Dredges: Scallop	Tongs	Rakes	Picks	By hand	Total, exclusive of duplication
	Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Fishermen:								
On vessels	186	100		10				1,289
On boats and shore:								
Regular	21	202	308	4,387	889	746	321	6,613
Casual				2,055	24		60	4,227
Total	207	302	308	6,452	913	746	381	12,129
Vessels:								
Steam								19
Net tonnage								2,021
Motor	56	16		3				109
Net tonnage	484	226		17				1,759
Sail		6						6
Net tonnage		39						39
Total vessels	56	22		3				134
Total net tonnage	484	265		17				3,819
Boats:								
Motor	7	104	154	3,250	176	72	30	4,495
Other		2	117	697	805	695	332	3,685
Accessory boats								52
Apparatus:								
Number	126	256	610	5,641	894	726		
Yards at mouth	251	347	407					

Fisheries of Virginia, 1932—Continued

CATCH: BY GEAR

Species	Purse seines				Haul seines		Gill nets	
	Menhaden		Other				Drift	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives					39,605	$449	9,176	$141
Bluefish			14,824	$408	58,013	2,482	16,100	813
Butterfish			640	8	1,900	76		
Carp					145,515	6,577	1,800	72
Catfish and bullheads					247,851	7,578		
Croaker					576,479	10,425	69,716	1,054
Drum, red or redfish					10,390	349		
Eels					475	18		
Flounders					20,419	817		
Gizzard shad					12,865	258	5,636	111
Hickory shad					808	21	3,182	64
Menhaden	193,920,600	$648,692						
Mullet					2,120	68	59	2
Pigfish					16,466	658		
Scup			770	19				
Sea bass			65	2				
Shad					8,053	817	563,863	42,249
Spot					128,921	3,861	13,124	394
Squeteagues or "sea trout":								
Gray			109,600	2,271	261,488	6,622	1,505	45
Spotted					59,167	3,747		
Striped bass					94,194	11,137	50,296	7,106
White perch					117,192	4,188		
Yellow perch					16,820	861		
Total	193,920,600	648,692	125,899	2,708	1,818,741	61,009	734,457	52,051

Species	Gill nets—Con.		Lines, trot with baits or snoods		Pounds nets		Stop nets	
	Stake							
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives	12,800	$182			13,768,672	$63,519		
Bluefish	400	24			460,389	21,679		
Bonito					50,420	2,321		
Butterfish					2,887,760	83,387		
Cabio or crab eater					2,515	50		
Carp					57,582	2,264	19,581	$793
Catfish and bullheads					213,741	6,411	3,084	92
Cod					10,664	264		
Croaker	28,784	726			12,358,846	201,024		
Drum:								
Black					29,362	297		
Red or redfish					14,734	469		
Eels					15,999	953		
Flounders					557,599	22,454		
Gizzard shad	15,685	314			32,725	654		
Harvestfish					93,988	2,369		
Hickory shad	410	8			43,311	865		
King whiting or "kingfish"					10,215	383		
Mackerel					23,517	1,136		
Menhaden					1,565,000	3,844		
Mullet	19,007	703			4,413	161		
Pigfish					13,938	541		
Scup					22,084	881		
Sea bass					5,394	241		
Shad	444,708	34,485			3,818,541	345,492		
Spanish mackerel					62,766	3,843		
Spot	2,225	79			606,994	17,878		
Squeteagues or "sea trout":								
Gray	11,450	458			11,336,817	267,819		
Spotted					25,155	1,742		
Striped bass	83,366	9,684			327,037	39,159		
Sturgeon					4,345	710		
Thimble-eyed mackerel					11,619	232		
White perch					102,047	3,369		
Yellow perch					3,122	181		
Crabs, hard			18,302,400	$181,741	115,000	863		
Squid					310,318	6,206		
Total	621,835	46,663	18,302,400	181,741	48,966,629	1,103,661	22,665	885

Fisheries of Virginia, 1932—Continued

CATCH: BY GEAR—Continued

Species	Fyke nets		Dip nets		Otter trawls	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives	22,200	$229			40	$1
Bluefish					1,013	84
Butterfish					16,323	718
Carp	15,668	629				
Catfish and bullheads	231,181	7,119				
Cod					11,286	257
Croaker	65,256	1,382			1,593,625	36,928
Drum, red or redfish					135	4
Eels	6,370	312			3,062	66
Flounders	10,610	410			601,761	24,704
Gizzard shad	23,823	476				
Haddock					460	10
Hake					31,084	574
Hickory shad	600	12				
King whiting or "kingfish"					16,715	572
Mullet	6,715	262				
Pigfish					3,053	57
Scup					1,688,966	44,557
Sea bass					835,405	24,127
Shad	12,322	1,273				
Spanish mackerel					68	6
Spot					2,054	52
Squeteagues or "sea trout":						
Gray	13,682	503			239,729	9,209
Spotted					165	12
Striped bass	36,406	4,369				
Sturgeon					487	85
Tautog					232	7
White perch	97,897	3,938			1,055	21
Yellow perch	64,258	3,327				
Crabs:						
Hard			326,509	$3,767		
Soft			1,372,838	81,041		
Shrimp					33	6
Scallops, sea					18	3
Squid					10,636	181
Total	606,988	24,241	1,699,347	84,808	5,057,405	142,241

Species	Pots, eel		Scrapes		Dredges — Crab	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Eels	420	$25				
Crabs:						
Hard			69,486	$869	8,210,650	$103,581
Soft			146,973	8,819		
Total	420	25	216,459	9,688	8,210,650	103,581

Species	Dredges—Continued				Tongs	
	Oyster		Scallop			
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Clams, hard, public					1,032,272	$234,120
Oysters:						
Market, public, spring	18,850	$1,375			1,542,022	108,028
Market, public, fall	30,300	1,810			4,308,989	273,104
Market, private, spring	1,336,390	104,075			1,761,796	145,458
Market, private, fall	2,781,282	201,541			2,161,921	161,797
Scallops, bay			658,584	$80,090		
Total	4,166,822	308,801	658,584	80,090	10,807,000	922,507

Fisheries of Virginia, 1932—Continued

CATCH: BY GEAR—Continued

Species	Rakes		Picks		By hand	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Crabs, soft					29,250	$1,950
Clams, hard, public	180,224	$40,709	236,960	$63,165	35,008	9,653
Oysters:						
Market, public, spring	8,976	449			44,826	2,242
Market, public, fall	17,478	874			89,652	4,483
Market, private, spring	321,916	25,271				
Market, private, fall	479,850	43,085				
Total	1,008,444	110,388	236,960	63,165	198,736	18,328

SEED OYSTER FISHERY: BY GEAR

Item	Tongs		Rakes		By hand		Total, exclusive of duplication	
OPERATING UNITS								
Fishermen, on boats and shore:	*Number*		*Number*		*Number*		*Number*	
Regular	1,078		86		10		1,174	
Casual	447						447	
Total	1,525		86		10		1,621	
Boats:								
Motor	674		12		2		688	
Other	102		72		10		184	
Apparatus: Number	1,265		86				1,351	
CATCH								
Oysters:	*Bushels*	*Value*	*Bushels*	*Value*	*Bushels*	*Value*	*Bushels*	*Value*
Seed, public, spring	549,962	$66,879	4,000	$320	4,000	$320	557,962	$67,519
Seed, public, fall	876,048	87,605	13,000	780	8,000	640	897,048	89,025
Seed, private, spring			13,000	1,040			13,000	1,040
Total	1,426,010	154,484	30,000	2,140	12,000	960	1,468,010	157,584

NOTE.—Of the number of persons fishing for seed oysters all are duplicated among those in the market oyster fishery or fisheries for other species, except in the fishery by tongs, 1,387 are duplicated. Similarly all the craft and gear are duplicates except in the fishery by tongs, 620 motor boats, 90 other boats, and 1,165 tongs are duplicated.

SHAD AND ALEWIFE FISHERIES OF THE POTOMAC RIVER

The catch of shad in the Potomac River in 1932 amounted to 352,745 roes and 422,711 bucks, having a combined weight of 2,264,168 pounds and a total value to the fishermen of $173,353. The catch of alewives for the same season amounted to 17,109,533 in number, with a total weight of 6,844,613 pounds and a value to the fishermen of $24,041. These figures indicate an increase of 10 percent in the weight and a decrease of 10 percent in the value of shad as compared with 1931 and a decrease of 7 percent in the weight and 57 percent in the value of alewives.

About 47 percent of the shad, in weight, was taken in pound nets, 52 percent in gill nets, and the remainder with haul seines. More than 99 percent of the catch of alewives was made in pound nets.

Shad and alewife fisheries of the Potomac River, 1932

Item	Maryland			Virginia			Total		
	Number	*Pounds*	*Value*	*Number*	*Pounds*	*Value*	*Number*	*Pounds*	*Value*
Fishermen on boats and shore:									
Regular	71			316			387		
Casual	138			178			316		
Total	209			494			703		
Boats:									
Motor	61			172			233		
Other	58			102			160		
Apparatus:									
Pound nets	61			305			366		
Gill nets	952			905			1,857		
Square yards	215,941			244,712			460,653		
Haul seines	2						2		
Length, yards	950						950		
Shad caught:									
With pound nets	23,211	67,001	$6,949	348,480	986,484	$89,945	371,691	1,053,485	$96,894
With gill nets	160,614	499,945	31,986	227,234	668,426	42,571	387,848	1,168,371	74,557
With haul seines	15,917	42,312	1,902				15,917	42,312	1,902
Total	199,742	609.258	40,837	575,714	1,654,910	132,516	775,456	2,264,168	173,353
Alewives caught:									
With pound nets	1,111,000	444,400	2,412	15,849,865	6,340,746	21,247	16,960,865	6,785,146	23,659
With gill nets				48,668	19,467	282	48,668	19,467	282
With haul sienes	100,000	40,000	100				100,000	40,000	100
Total	1,211,000	484,400	2,512	15,898,533	6,360,213	21,529	17,109,533	6,844,613	24,041

TRADE IN FISHERY PRODUCTS IN WASHINGTON, D.C.[7]

The municipal fish wharf and market in Washington, D.C., is located in the southwestern part of the city on an arm of the Potomac River. At the present time, 16 fishery firms have stalls in the market, 3 firms are in private buildings across the street, and 4 firms have stalls in the new Center Market. Altogether, the 23 above firms employed 113 persons who received $78,996 in salaries and wages during 1932. Of the total employees, 98 were regularly employed. These firms conduct a wholesale and retail business, chiefly wholesale however.

During the year 1932, the receipts of fresh and frozen fishery products as received at the municipal wharf amounted to 11,434,119 pounds. This is an increase of 23 percent as compared with the year 1931, and an increase of 31 percent as compared with the 5-year average.

During the year 1932, three firms in Washington, D.C., smoked fishery products, which amounted to 271,950 pounds, valued at $22,847. Of this amount, 238,000 pounds, valued at $14,280, consisted of herring; 32,900 pounds, valued at $8,357, were whitefish; while the remainder, 1,050 pounds, valued at $210, were alewives or "river herring", and eels. There were four firms which shucked oysters mostly for select retail trade. Their production amounted to 8,700 gallons, valued at $13,530. Most of the smoked fish and shucked oysters were marketed in the city.

[7] Statistics of fishery products handled at the municipal wharf, Washington, D.C., are reported to the Bureau by agents of the city health department.

Fishery products received at Municipal Fish Wharf and Market, Washington, D.C., 1932

Species	January	February	March	April	May	June	July
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Alewives (river herring)	27,750	72,100	124,200	598,500	433,500	-------	-------
Bluefish	2,600	4,600	3,200	1,800	10,800	19,300	27,900
Butterfish	10,400	3,200	6,200	9,800	100,200	141,426	90,800
Carp	13,600	7,000	10,600	23,400	11,200	7,800	1,500
Catfish	9,800	15,400	21,800	42,800	8,400	6,700	200
Cod	1,000	-------	1,000	200	1,000	800	500
Croaker	88,200	36,200	52,200	164,800	191,400	224,800	243,000
Drum, red or redfish	-------	-------	650	-------	-------	-------	-------
Eels	1,600	2,200	2,150	6,000	1,080	800	200
Flounders	20,200	51,000	36,400	15,800	15,600	17,400	26,500
Gizzard shad	12,700	5,050	1,800	-------	-------	-------	-------
Haddock	31,000	27,300	45,250	34,650	27,650	26,420	23,980
Hake	-------	-------	1,800	-------	-------	-------	-------
Halibut	15,800	11,050	18,600	9,800	9,266	10,200	5,420
Hickory shad or "jacks"	7,850	10,400	3,925	1,600	-------	-------	-------
King whiting or "kingfish"	3,000	600	-------	9,400	600	1,600	-------
Mackerel	12,400	29,400	19,000	8,000	20,200	25,804	12,400
Mullet	400	8,600	1,600	-------	-------	-------	600
Perch	9,800	26,200	32,100	68,600	5,600	3,100	1,800
Pike or pickerel	600	800	400	400	400	900	800
Pollock	400	-------	-------	-------	400	-------	-------
Salmon	2,200	3,200	4,400	800	4,400	5,400	3,300
Scup or porgy	34,200	17,000	25,800	9,000	8,600	13,600	1,700
Sea bass	92,000	72,200	67,200	29,600	6,400	32,402	10,800
Shad	17,755	51,585	90,950	1,074,200	500,800	13,400	-------
Smelt	2,800	3,200	5,700	-------	-------	-------	-------
Snapper, red	800	1,200	100	800	400	700	400
Spot	1,000	3,000	1,400	-------	800	1,600	27,400
Squeteagues or "sea trout"	60,200	47,800	43,000	97,800	247,900	288,600	204,800
Striped bass	5,400	7,000	27,400	35,000	8,200	2,200	2,900
Sturgeon	-------	-------	-------	325	300	200	-------
Swordfish	-------	-------	375	-------	-------	800	600
Tilefish	-------	200	-------	200	-------	-------	-------
Whitefish	600	200	-------	-------	200	800	1,800
Whiting	500	-------	-------	-------	-------	-------	-------
Crabs:							
Hard	-------	-------	-------	3,075	84,050	102,675	63,450
Soft	-------	-------	-------	2,520	13,365	29,520	10,980
Oyster	-------	-------	-------	-------	-------	-------	-------
Meat	2,430	3,825	4,525	7,800	19,125	39,350	32,705
Sea crawfish or "spiny lobster":							
Alive	-------	-------	50	-------	-------	-------	-------
Lobsters:							
Alive	550	400	700	1,850	950	1,060	440
Meat	-------	-------	-------	-------	-------	180	65
Shrimp	5,500	11,000	8,250	8,250	8,250	7,875	5,875
Squid	2,200	800	600	-------	800	-------	-------
Clams	4,352	4,480	5,248	6,016	7,840	8,352	6,304
Oysters:							
In the shell (meat)	71,400	78,680	52,430	16,100	630	-------	-------
Opened (meat)	63,262	77,306	77,744	10,981	-------	-------	-------
Scallops	400	1,400	920	1,440	400	1,280	680
Frogs	-------	-------	-------	-------	-------	-------	9
Turtles	-------	-------	-------	250	-------	160	260
Total	645,649	695,576	799,667	2,801,557	1,700,706	1,036,204	808,568

Fishery products received at Municipal Fish Wharf and Market, Washington, D.C., 1932—Continued

Species	August	September	October	November	December	Total
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Alewives (river herring)						1, 256, 050
Bluefish	26, 900	37, 500	71, 200	39, 400	13, 800	259, 000
Butterfish	35, 000	23, 500	22, 800	18, 100	2, 900	463, 826
Carp	4, 200	12, 600	13, 200	4, 600	8, 800	118, 500
Catfish	600	6, 900	30, 200	18, 700	4, 900	166, 400
Cod	500	300	800	1, 000	400	7, 000
Croaker	270, 800	163, 300	54, 400	83, 200	121, 000	1, 693, 300
Drum, red or redfish	800	800	1, 600	3, 400	10, 100	17, 350
Eels	200	900	2, 800	1, 200		19, 130
Flounders	29, 700	15, 800	18, 000	26, 500	22, 800	304, 700
Gizzard shad		200	3, 600	16, 300	11, 600	51, 250
Haddock	22, 815	21, 360	59, 800	28, 070	23, 780	372, 075
Hake					3, 100	4, 900
Halibut	5, 600	5, 800	7, 400	3, 000	3, 800	105, 736
Hickory shad or "jacks"						23, 775
Hogfish	200	1, 600				1, 800
King whiting or "kingfish"		300		900	600	17, 000
Mackerel	21, 300	16, 300	21, 600	27, 600	29, 200	243, 204
Mullet	1, 700	9, 200	6, 200	12, 000	3, 200	43, 500
Perch	1, 400	2, 100	5, 500	7, 600	4, 900	168, 700
Pike or pickerel	800	3, 000	400	900	1, 600	11, 000
Pollock				200	1, 600	2, 600
Pompano	600					600
Salmon	3, 800	3, 300	5, 800	5, 200	1, 600	43, 400
Scup or porgy	1, 400	1, 100		17, 900	15, 200	145, 500
Sea bass	21, 300	4, 000	4, 600	12, 900	11, 100	364, 502
Shad						1, 748, 690
Sheepshead	100	100			300	500
Smelt				75	1, 050	12, 825
Snapper, red	200		400	600	700	6, 300
Spot	8, 500	14, 600	38, 400	14, 400	600	111, 700
Squeteagues or "sea trout"	224, 400	178, 900	189, 000	143, 600	97, 800	1, 823, 800
Striped bass	1, 400	5, 400	13, 500	41, 100	17, 700	167, 200
Sturgeon			75	50		950
Swordfish	1, 100	400		200		2, 975
Tilefish		200		400	100	1, 100
Whitefish	1, 700	3, 000		1, 100	600	9, 500
Whiting					9, 200	9, 700
Crabs:						
Hard	53, 550	15, 150	6, 000			277, 950
Soft	14, 445	19, 530	7, 110	135		97, 605
Oyster					5	5
Meat	30, 830	18, 990	13, 160	6, 485	4, 335	183, 560
Sea crawfish or "spiny lobster":						
Alive	150	100	100	200	200	800
Meat	50	125		60	100	335
Lobsters:						
Alive	480	400	300	520	2, 850	10, 500
Meat	10	175	75	60	225	790
Shrimp	9, 000	7, 125	4, 875	6, 375	5, 875	87, 750
Squid				1, 500	700	6, 600
Clams	7, 200	6, 976	4, 768	4, 416	4, 128	[1] 70, 080
Oysters:						
In the shell (meat)		8, 974	82, 026	51, 037	34, 475	[2] 395, 752
Opened (meat)		12, 276	64, 899	85, 838	93, 879	[3] 486, 185
Scallops	2, 520	616	680	1, 536	1, 616	[4] 13, 488
Frogs	72	6				87
Terrapin					64	64
Turtles	40	540		960	320	2, 530
Total	805, 362	623, 443	755, 268	689, 317	572, 802	11, 434, 119

[1] 8,760 bushels.
[2] 56,536 bushels.
[3] 55,564 gallons.
[4] 1,686 bushels.

NOTE.—The clams have been converted to pounds on the basis of 8 pounds of meats to the bushel, the oysters on the basis of 7 pounds of meats to the bushel and 8¾ pounds to the gallon, and the scallops on the basis of 8 pounds of meats to the bushel.

FISHERIES OF THE SOUTH ATLANTIC AND GULF STATES

(South Atlantic, area XXIV; Gulf, area XXV [8])

The yield of the commercial fisheries in the South Atlantic and Gulf States (North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Texas) during 1932 amounted to 299,916,728 pounds, valued at $6,428,385 to the fishermen, representing an increase of 4 percent in volume but a decrease of 20 percent in value as compared with the catch in the previous year. In addition there was a production of 39,741 bushels of seed oysters, valued at $8,280. These fisheries gave employment to 21,560 fishermen.

Fisheries of the South Atlantic and Gulf States, 1932

SUMMARY OF CATCH

Product	North Carolina		South Carolina		Georgia	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Fish	82,209,976	$689,421	593,974	$37,531	12,097,286	$75,911
Shellfish, etc	4,004,017	137,322	3,942,314	85,860	4,425,709	110,031
Total	86,213,993	826,743	4,536,288	123,391	16,522,995	185,942

Product	Florida		Alabama		Mississippi	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Fish	81,108,701	$1,569,398	1,792,434	$62,766	1,046,866	$22,486
Shellfish, etc	22,181,520	1,403,986	4,314,053	105,825	19,555,719	474,931
Total	103,290,221	2,973,384	6,106,487	168,591	20,602,585	497,417

Product	Louisiana		Texas		Total	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Fish	1,273,961	$68,092	4,034,327	$189,456	184,157,525	$2,715,061
Shellfish, etc	47,066,364	1,112,561	10,269,507	282,808	115,759,203	3,713,324
Total	48,340,325	1,180,653	14,303,834	472,264	299,916,728	6,428,385

OPERATING UNITS: BY STATES

Item	North Carolina	South Carolina	Georgia	Florida	Alabama	Mississippi	Louisiana	Texas	Total
Fishermen:	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*
On vessels	758	17	86	638	139	474	154	143	2,409
On boats and shore:									
Regular	2,754	615	427	5,988	860	829	1,864	1,223	14,060
Casual	1,411	843	539	1,331	90	205	289	383	5,091
Total	4,923	1,475	1,052	7,957	589	1,508	2,307	1,749	21,560
Vessels:									
Motor	79	4	20	98	31	114	62	33	441
Net tonnage	1,234	59	245	2,467	299	1,507	447	388	6,646
Sail	53			1		15	2		71
Net tonnage	502			64		237	38		841
Total vessels	132	4	20	99	31	129	64	33	512
Total net tonnage	1,736	59	245	2,531	299	1,744	485	388	7,487

[8] These are the numbers given to these areas by the North American Council on Fishery Investigations. It should be observed that the persons engaged, gear and craft employed, and catch of the seed oyster fishery are not included among the statistics of the fishery for market oysters and other species but are shown in footnotes or in separate tables in this section.

Fisheries of the South Atlantic and Gulf States, 1932—Continued

OPERATING UNITS: BY STATES—Continued

Item	North Carolina	South Carolina	Georgia	Florida	Alabama	Mississippi	Louisiana	Texas	Total
Boats:	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*
Motor	1,154	84	119	2,318	153	268	574	382	5,052
Other	1,584	773	523	2,945	151	407	996	418	7,797
Accessory boats	70		4	11					85
Apparatus:									
Purse seines:									
Menhaden	33		2	5					40
Length, yards	8,025		600	1,450					10,075
Other	1			1					2
Length, yards	175			400					575
Haul seines:									
Common	454	20	11	110	5	3	102	54	759
Length, yards	66,326	2,780	1,105	34,300	2,900	800	13,434	9,315	130,960
Long	56			76					132
Length, yards	58,275			59,200					117,475
Gill nets:									
Anchor	1,661	324	45	12					2,042
Square yards	908,610	154,872	10,625	9,600					1,083,707
Drift	227	323	158	146					854
Square yards	399,265	284,554	111,863	139,606					935,288
Runaround	188	7	10	2,111				47	2,363
Square yards	83,500	1,450	3,170	2,110,492				13,165	2,211,777
Stake	5,271		40	5	18			267	5,601
Square yards	561,965		10,050	1,250	2,880			74,845	650,990
Trammel nets				182	53	39	23	61	358
Square yards				122,469	17,365	15,775	6,985	22,071	184,665
Lines:									
Hand	86	180	43	1,620	149	132	167	467	2,844
Hooks	166	550	46	2,573	260	142	172	594	4,503
Troll	45			1,190	2			8	1,245
Hooks	45			1,485	2			8	1,540
Trot with baits or snoods	156	6	31	13	15	36	318	25	600
Baits or snoods	119,000	4,500	9,390	2,700	2,336	8,895	60,025	3,175	210,021
Trot with hooks	26		40	198	101		3	48	416
Hooks	3,200		2,840	85,005	10,370		300	6,915	108,630
Pound nets	1,722			13					1,735
Weirs	2								2
Wheels	21								21
Stop nets				7					7
Square yards				11,475					11,475
Fyke nets	801			278	6				1,085
Dip nets:									
Common	204			50					254
Drop				54		130	1,520		1,704
Cast nets			10	16		60	18		104
Otter trawls:									
Fish	2			4					6
Yards at mouth	41			109					150
Shrimp	51	28	125	376	112	255	476	251	1,674
Yards at mouth	1,007	560	2,510	7,135	1,465	3,154	5,942	3,634	25,407
Pots:									
Crab			12	1,433					1,445
Eel	1,285			40					1,325
Fish	465		81	1,515					2,061
Sea crawfish				3,190					3,190
Spears	50	6		27	30	63		152	328
Dredges:									
Clam				1					1
Oyster	182			2		328	26	39	577
Yards at mouth	182			2		329	26	38	577
Scallop	64								64
Yards at mouth	64								64
Tongs	387	6	120	413	142	245	465	222	2,000
Rakes	483		4						487
Forks				40					40
Grabs		333	60						393
Coquina scoops				3					3
Hooks, sponge				201					201
Diving apparatus				54					54

Fisheries of the South Atlantic and Gulf States, 1932—Continued

CATCH: BY STATES

Species	North Carolina		South Carolina		Georgia	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
FISH						
Alewives	6,584,000	$41,899				
Black bass	31,800	3,180				
Bluefish	686,597	16,409	4,062	$325		
Bowfin	1,700	17				
Butterfish	54,514	786				
Carp	128,400	6,640				
Catfish and bullheads	524,904	9,600			98,389	$5,841
Cero	13,000	520				
Croaker	4,540,356	46,642			8,226	329
Drum, red or redfish	87,200	1,744	3,170	108	2,141	107
Eels	56,715	1,877			550	22
Flounders	789,767	32,797	5,175	284	2,904	88
Gizzard shad	19,200	161				
Grunts			6,300	220		
Hake	1,624	22				
Harvestfish or "starfish"	1,077,381	11,858				
Hickory shad	117,325	4,055	11,066	886	9,841	707
Hogfish	992	12				
King whiting or "kingfish"	300,048	4,033	16,210	610	19,746	617
Menhaden	54,476,000	75,135			11,520,000	16,000
Mullet	2,472,050	51,655	148,050	6,042	52,627	1,904
Pigfish	62,200	627				
Pike or pickerel	5,200	393				
Pinfish or sailors choice	270,000	1,012				
Pompano	150	22				
Scup	5,615	172				
Sea bass	202,495	6,251	218,750	8,187	32,000	960
Shad	924,994	125,926	123,036	15,459	288,145	45,111
Sharks			8,000	80		
Sheepshead	2,650	53				
Spanish mackerel	77,900	3,660				
Spot	1,587,555	17,821	10,000	400	9,542	351
Squeteagues or "sea trout":						
Gray	3,636,323	64,097	2,460	148	2,000	120
Spotted	1,895,700	78,363	14,355	1,048	46,210	3,357
Striped bass	506,760	54,516				
Sturgeon	1,661	179	23,340	3,734	4,965	397
Suckers	450	9				
Sunfish	55,250	1,105				
White perch	831,600	21,302				
Yellow perch	179,900	4,871				
Total	82,209,976	689,421	593,974	37,531	12,097,286	75,911
SHELLFISH, ETC.						
Crabs:						
Hard [1]	1,847,600	18,448	16,000	320	225,492	3,383
Soft	308,555	33,921				
Shrimp	292,104	9,393	1,500,687	32,529	3,601,564	89,547
Clams, hard, public [2]	260,624	17,278	4,800	600	600	75
Oysters: [3]						
Market, public, spring	626,462	25,067	1,205,886	21,569		
Market, public, fall	563,478	25,613	475,704	10,175		
Market, private, spring	10,216	559	429,460	9,646	413,121	8,789
Market, private, fall	1,200	100	306,791	10,466	175,287	6,881
Scallops, bay	91,458	6,560				
Octopus			1,200	72		
Squid	763	13				
Terrapin, diamond-back	1,557	370	1,786	483	9,645	1,356
Total	4,004,017	137,322	3,942,314	85,860	4,425,709	110,031
Grand total	86,213,993	826,743	4,536,288	123,391	16,522,995	185,942

Species	Florida		Alabama		Mississippi	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
FISH						
Alewives	79,947	$437				
Amberjack	4,577	122				
Barracuda	4,245	180				
Black bass	278,477	18,518				
Bluefish	1,421,233	60,614	12,401	$563	4,730	$86
Blue runner or hardtail	162,507	2,311	924	17		
Buffalofish			11,829	323		
Butterfish	997	47				
Cabio or crab eater	5,145	103	550	15	110	2
Catfish and bullheads	3,531,636	116,214	60,211	2,736	27,115	493
Cero	275	4				
Cigarfish	9,350	170				
Cod	2,039	43				
Crappie	404,926	11,866				

See foot notes at end of table.

Fisheries of the South Atlantic and Gulf States, 1932—Continued

CATCH: BY STATES—Continued

Species	Florida		Alabama		Mississippi	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
FISH—continued						
Crevalle	22,751	$518	259	$5	990	$9
Croaker	25,775	431	18,111	330	10,835	191
Dolphin	12,050	361				
Drum:						
Black	48,010	817	742	14	8,937	115
Red or redfish	764,784	11,894	44,292	2,645	75,100	2,062
Eels	7,560	153				
Flounders	455,131	12,365	21,490	1,668	46,540	2,129
Frigate mackerel	2,250	90				
Groupers	3,163,878	64,600	99,746	1,998	16,117	322
Grunts	44,391	1,297				
Hake	8,218	165				
Hickory shad	28,147	507				
Hogfish	28,430	853				
Jewfish	30,290	1,034				
Kingfish or "king mackerel"	3,294,501	119,544	880	40		
King whiting or "kingfish"	285,059	6,880	3,718	68	2,728	45
Ladyfish	2,622	39				
Menhaden	23,349,860	41,220				
Mojarro	35,589	514				
Mullet	21,141,449	338,254	696,958	10,673	564,970	8,235
Muttonfish	203,135	8,811				
Paddlefish or spoonbill cat			1,320	60		
Permit	2,850	107				
Pigfish	66,548	948				
Pinfish or sailors choice	24,975	485				
Pompano	581,263	80,087	3,144	436	132	12
Porgies	25,786	512				
Porkfish	363	7				
Scup	247,792	5,936				
Sea bass	250,995	8,102				
Shad	546,086	52,940				
Sharks	5,043,000	12,005				
Sheepshead	535,330	8,456	4,441	120	23,815	539
Snapper:						
Mangrove	95,580	2,407				
Red	4,588,265	228,536	681,573	30,263	36,812	1,841
Snook or sergeantfish	301,780	6,936				
Spanish mackerel	6,337,598	209,836	8,028	292		
Spot	68,360	925	401	7		
Squeteagues or "sea trout":						
Gray	21,418	676	6,050	110	103,015	1,873
Spotted	2,666,525	106,425	103,224	9,392	124,394	4,524
Sturgeon	4,379	199	10,742	977		
Sunfish	662,494	16,831				
Tenpounder	77,845	1,349	1,400	14	350	4
Tripletail	890	18			176	4
Tuna or "horse mackerel"	3,350	134				
Turbot	4,125	124				
Yellowtail	91,870	4,441				
Total	81,108,701	1,509,398	1,792,434	62,766	1,046,866	22,486
SHELLFISH, ETC.						
Crabs:						
Hard [1]	82,182	3,519	70,070	982	320,107	4,665
Soft			1,280	236	8,572	893
Stone	153,825	8,335				
Sea crawfish or spiny lobster	445,547	32,078				
Shrimp	18,136,334	535,198	3,381,700	71,910	14,009,720	267,428
Clams:						
Coquina	5,400	335				
Hard, public [2]	1,120,812	42,742				
Conchs	1,500	120				
Oysters: [3]						
Market, public, spring	542,438	27,493	748,952	27,216	4,472,358	169,783
Market, public, fall	659,715	35,668	88,485	3,892	749,962	32,162
Market, private, spring	186,558	7,880	3,960	220		
Market, private, fall	113,495	6,320	17,820	990		
Scallops, bay	61,965	6,885				
Squid	7,553	147				
Frogs			697	104		
Terrapin, diamond-back			1,089	275		
Turtles, soft-shell	51,669	336				
Sponges:						
Grass	181,367	37,319				
Sheepswool	277,087	593,674				
Velvet	71	20				
Wire	29,406	13,387				
Yellow	124,536	52,524				
Total	22,181,520	1,403,986	4,314,053	105,825	10,555,719	474,931
Grand total	103,290,221	2,973,384	6,106,487	168,591	20,602,585	497,417

See footnotes at end of table.

Fisheries of the South Atlantic and Gulf States, 1932—Continued

CATCH: BY STATES—Continued

Species	Louisiana		Texas		Total	
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives					6,663,947	$42,336
Amberjack					4,577	122
Barracuda					4,245	180
Black bass					310,277	21,698
Bluefish			1,760	$80	2,130,783	78,077
Blue runner or hardtail					163,431	2,328
Bowfin					1,700	17
Buffalofish					11,829	323
Butterfish					55,511	833
Cabio or crab eater					5,805	120
Carp					128,400	6,640
Catfish and bullheads	44,850	$1,583	76,825	2,752	4,363,930	139,219
Cero					13,275	524
Cigarfish					9,350	170
Cod					2,039	43
Crappie					404,926	11,806
Crevalle	300	9			24,300	541
Croaker	44,470	1,924	27,025	576	4,674,798	50,423
Dolphin					12,050	361
Drum:						
Black	87,412	2,704	932,091	17,153	1,077,192	20,803
Red or redfish	281,739	14,493	824,819	45,322	2,083,245	78,375
Eels					64,825	2,052
Flounders	4,405	314	70,515	4,614	1,395,927	54,259
Frigate mackerel					2,250	90
Garfish	300	15			300	15
Gizzard shad					19,200	161
Groupers	3,400	68	18,301	380	3,301,442	67,368
Grunts					50,691	1,517
Hake					9,842	187
Harvestfish or "starfish"					1,077,381	11,858
Hickory shad					166,379	6,155
Hogfish					29,422	865
Jewfish	2,400	48	5,750	165	38,440	1,247
Kingfish or "king mackerel"			5,280	162	3,300,661	119,746
King whiting or "kingfish"	16,000	374	8,535	155	652,044	12,782
Ladyfish					2,622	39
Menhaden					89,345,860	132,355
Mojarro					35,589	514
Mullet	6,300	155	4,950	90	25,087,354	417,008
Muttonfish					203,135	8,811
Paddlefish or spoonbill cat					1,320	60
Permit					2,850	107
Pigfish					128,748	1,575
Pike or pickerel					5,200	393
Pinfish or sailors choice					294,975	1,497
Pompano	90	11	5,159	469	589,938	81,037
Porgies					25,786	512
Porkfish					363	7
Scup					253,407	6,108
Sea bass					704,240	23,500
Shad					1,882,281	239,436
Sharks					5,051,000	12,085
Sheepshead	77,673	4,010	29,154	599	673,063	13,786
Snapper:						
Mangrove					95,580	2,407
Red	66,884	4,013	985,291	50,076	6,358,825	314,729
Snook or sergeantfish			20,893	569	322,673	7,505
Spanish mackerel	400	16	41,140	2,616	6,465,066	216,420
Spot	3,450	87			1,679,308	19,591
Squeteagues or "sea trout":						
Gray	220,471	6,603			3,991,737	73,627
Spotted	412,427	31,607	976,344	63,660	6,239,179	298,376
Striped bass			495	18	507,255	54,534
Sturgeon					45,087	5,486
Suckers					450	9
Sunfish					717,744	17,936
Tenpounder					79,595	1,367
Tripletail	990	49			2,056	71
Tuna or "horse mackerel"					3,350	134
Turbot					4,125	124
White perch					831,600	21,302
Yellow perch					179,900	4,871
Yellowtail					91,870	4,441
Total	1,273,961	68,092	4,034,327	189,456	184,157,525	2,715,061

Fisheries of the South Atlantic and Gulf States, 1932—Continued

CATCH: BY STATES—Continued

Species	Louisiana		Texas		Total	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
SHELLFISH, ETC.						
Crabs:						
Hard [1]	5,877,737	$56,776	44,660	$669	8,483,848	$88,762
Soft	99,340	25,258			412,747	60,308
Stone					153,825	8,335
Sea crawfish or spiny lobster					445,547	32,078
Shrimp	38,095,780	800,452	9,244,246	229,520	88,262,135	2,035,986
Clams:						
Coquina					5,400	335
Hard, public [2]					1,386,836	60,695
Conchs					1,500	120
Oysters: [3]						
Market, public, spring	267,672	16,054	442,932	25,591	8,306,700	312,773
Market, public, fall			537,669	27,019	3,075,013	134,529
Market, private, spring	1,164,853	92,616			2,208,168	119,716
Market, private, fall	1,545,536	119,657			2,160,129	144,414
Scallops, bay					153,423	13,445
Octopus					1,200	72
Squid					8,316	160
Frogs					697	104
Terrapin, diamond-back	8,996	1,619			23,073	4,103
Turtles:						
Loggerhead	6,450	129			6,450	129
Soft-shell					51,669	336
Sponges:						
Grass					181,367	37,319
Sheepswool					277,087	593,674
Velvet					71	20
Wire					29,466	13,387
Yellow					124,536	52,524
Total	47,066,364	1,112,561	10,269,507	282,808	115,759,203	3,713,324
Grand total	48,340,325	1,180,653	14,303,834	472,264	299,910,728	6,428,385

[1] Statistics on hard crabs used in this table are based on yields of 3 pounds per dozen in North Carolina; 6 pounds in South Carolina and Georgia; 7.32 pounds in Florida; 6.25 pounds in Mississippi; 6.98 pounds in Alabama and Texas; and 6.45 pounds in Louisiana.

[2] Statistics on hard clams used in this table are based on yields of 8 pounds of meats per bushel in all States.

[3] Statistics on market oysters used in this table are based on yield of 5.71 pounds of meats per bushel in North Carolina; 4.76 in South Carolina; 5.69 in Georgia; 3.29 in Florida; 2.40 in Alabama; 2.19 in Mississippi; 4.14 in Louisiana; and 5.05 in Texas.

NOTE.—Of the total catch in North Carolina, 268,136 pounds of fishery products, valued at $5,925, were taken in the winter trawl fishery off Maryland, Virginia, and North Carolina. Of the total catch in Florida, 942,791 pounds of fishery products, valued at $20,607, were taken in the same fishery. These products consisted principally of scup, sea bass, flounders, croaker, and gray squeteague. The seed oyster fishery was prosecuted in this section only in North Carolina where 12 regular fishermen using 6 motor boats and 12 dredges took 39,741 bushels of seed oysters, valued at $8,280, from public beds. None of these fishermen, craft, or gear was duplicated among those in the fisheries for market oysters or other species.

PRODUCTION OF CERTAIN SHELLFISH IN NUMBER AND BUSHELS

Product	North Carolina		South Carolina		Georgia	
	Quantity	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
Crabs:						
Hard ... number	7,390,400	$18,448	32,000	$320	450,984	$3,383
Soft ... do	1,120,054	33,921				
Clams, hard, public ... bushels	32,578	17,278	600	600	75	75
Oysters:						
Market, public, spring ... do	109,713	25,067	253,337	21,569		
Market, public, fall ... do	98,683	25,613	99,938	10,175		
Market, private, spring ... do	1,789	559	90,223	9,646	72,605	8,789
Market, private, fall ... do	210	100	64,452	10,466	30,806	6,881
Scallops, bay ... do	16,629	6,560				

Fisheries of the South Atlantic and Gulf States, 1932—Continued

PRODUCTION OF CERTAIN SHELLFISH IN NUMBER AND BUSHELS—Continued

Product	Florida		Alabama		Mississippi	
	Quantity	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
Crabs:						
Hard .... number..	134, 778	$3, 519	120, 520	$982	614, 605	$4, 665
Soft .... do....			3, 840	236	10, 716	893
Clams, hard, public .... bushels..	140, 101	42, 742				
Oysters:						
Market, public, spring .... do....	164, 875	27, 493	312, 063	27, 216	2, 042, 173	169, 783
Market, public, fall .... do....	200, 521	35, 668	36, 869	3, 892	342, 448	32, 162
Market, private, spring .... do....	56, 705	7, 886	1, 650	220		
Market, private, fall .... do....	34, 497	6, 320	7, 425	990		
Scallops, bay .... do....	11, 692	6, 885				

Product	Louisiana		Texas		Total	
	Quantity	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
Crabs:						
Hard .... number..	10, 932, 591	$56, 776	76, 815	$669	19, 752, 693	$88, 762
Soft .... do....	298, 020	25, 258			1, 432, 630	60, 308
Clams, hard, public .... bushels..					173, 354	60, 695
Oysters:						
Market, public, spring .... do....	64, 655	16, 054	87, 709	25, 591	3, 034, 525	312, 773
Market, public, fall .... do....			106, 469	27, 019	884, 928	134, 52
Market, private, spring .... do....	281, 365	92, 616			504, 337	119, 716
Market, private, fall .... do....	373, 318	119, 657			510, 708	144, 414
Scallops, bay .... do....					28, 321	13, 445

NORTH CAROLINA

Fisheries of North Carolina, 1932

OPERATING UNITS: BY GEAR

Item	Purse seines		Haul seines		Gill nets			
	Menhaden	Other	Common	Long	Anchor	Drift	Runaround	Stake
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels	418		60	120	46	21		
On boats and shore:								
Regular	48	7	925	147	298	274	119	281
Casual			311	62	72	32	100	86
Total	466	7	1, 296	329	416	327	219	367
Vessels:								
Motor	27		11	37	15	5		
Net tonnage	884		67	257	91	28		
Boats:								
Motor	6	1	221	54	160	89	59	184
Other	10	2	398	47	100	51	103	109
Accessory boats	50		3	17				
Apparatus:								
Number	33	1	454	56	1, 661	227	188	5, 271
Length, yards	8, 025	175	66, 326	58, 275				
Square yards					908, 610	399, 265	83, 500	561, 965

Fisheries of North Carolina, 1932—Continued

OPERATING UNITS: BY GEAR—Continued

Item	Lines				Pound nets	Weirs	Wheels
	Hand	Troll	Trot with baits or snoods	Trot with hooks			
	Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Fishermen:							
On vessels	17						
On boats and shore:							
Regular	20	70	105	6	468		8
Casual	40	10	74	16	211	1	
Total	77	80	179	22	679	1	8
Vessels:							
Motor	6						
Net tonnage	41						
Boats:							
Motor	30	35	86	2	215	1	8
Other			58	11	216		10
Apparatus:							
Number	86	45	156	28	1,722	2	21
Hooks, baits or snoods	166	45	119,000	3,200			

Item	Fyke nets	Dip nets	Otter trawls		Pots		Spears
			Fish	Shrimp	Eel	Fish	
	Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Fishermen:							
On vessels			6	14			
On boats and shore:							
Regular	43	184		90	24	12	20
Casual	12	20			9	14	30
Total	55	204	6	104	33	26	50
Vessels:							
Motor			2	6			
Net tonnage			32	36			
Boats:							
Motor	34	10		45	4		
Other	24	127			28	19	45
Apparatus:							
Number	801	204	2	51	1,285	465	50
Yards at mouth			41	1,007			

Item	Dredges		Tongs	Rakes	By hand	Total, exclusive of duplication
	Oyster	Scallop				
	Number	*Number*	*Number*	*Number*	*Number*	*Number*
Fishermen:						
On vessels	156					758
On boats and shore:						
Regular	56	68	154	198	40	2,754
Casual	20		238	285	20	1,411
Total	232	68	392	483	60	4,923
Vessels:						
Motor						79
Net tonnage						1,234
Sail	53					53
Net tonnage	502					502
Total vessels	53					132
Total net tonnage	502					1,736
Boats:						
Motor	38	34	67	10		1,154
Other			262	415	40	1,584
Accessory boats						70
Apparatus:						
Number	182	64	387	483		
Yards at mouth	182	64				

Fisheries of North Carolina, 1932—Continued

CATCH: BY GEAR

Species	Purse seines				Haul seines			
	Menhaden		Other		Common		Long	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives					781,400	$6,878	550,100	$4,752
Black bass					26,564	2,656	468	47
Bluefish					151,900	3,513	90,500	2,410
Bowfin					1,200	12		
Butterfish					24,750	445	5,000	50
Carp					66,000	3,625	19,000	1,190
Catfish and bullheads					237,000	3,800	126,504	2,017
Croaker					527,000	5,256	2,202,000	22,020
Drum, red or redfish					31,200	624	15,000	300
Eels							200	5
Flounders					140,850	6,078	16,300	200
Gizzard shad					3,000	25	5,700	31
Harvestfish or "starfish"					87,400	879	10,000	100
Hickory shad					16,000	480		
King whiting or "kingfish"					166,700	2,289	50,000	500
Menhaden	54,378,200	$75,061			97,800	74		
Mullet					1,712,550	33,625	200	8
Pigfish					12,000	125	50,000	500
Pike or pickerel					4,000	320		
Pinfish or sailors choice	90,000	112			30,000	150	150,000	750
Pompano					150	22		
Sea bass					30,000	1,200		
Shad					19,000	2,580	36,400	4,550
Sheepshead					400	8		
Spanish mackerel					24,900	1,295		
Spot					770,200	9,132	422,000	4,220
Squeteagues or "sea trout":								
Gray					253,400	4,558	337,000	5,540
Spotted					607,000	24,970	1,111,000	45,940
Striped bass			75,000	$11,250	94,200	8,850	142,400	11,998
Sturgeon					600	60		
Sunfish					34,100	682	16,000	320
White perch					297,500	7,334	165,000	4,575
Yellow perch					106,500	2,987	29,250	855
Crabs, soft					195,591	21,497		
Terrapin, diamond-back					557	120		
Total	54,468,200	75,173	75,000	11,250	6,551,412	156,149	5,550,022	112,878

Species	Gill nets							
	Anchor		Drift		Runaround		Stake	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives	140,500	$1,282	110,000	$800	1,000	$5	126,000	$1,460
Bluefish	4,000	80	78,400	2,840	25,000	500	314,000	6,280
Butterfish	1,250	18					1,000	20
Croaker	377,000	3,820	350,000	3,500	11,500	115	29,000	340
Drum, red or redfish	2,500	50					500	10
Eels	150	3						
Flounders	400	12			500	10		
Gizzard shad	3,000	30						
Harvestfish or "starfish"	2,000	20						
Hickory shad	22,900	837					10,000	250
King whiting or "kingfish"	47,000	665						
Mullet	53,500	1,070	95,000	2,200	429,500	10,585	176,500	3,980
Pigfish							200	2
Sea bass	20,000	600			10,000	300		
Shad	242,000	29,190	66,269	7,952			160,300	25,761
Spanish mackerel	500	15						
Spot	95,800	958	10,000	250	40,500	745	57,555	576
Squeteagues or "sea trout":								
Gray	209,000	6,070	206,000	8,120	2,000	80	115,500	2,110
Spotted			30,000	1,355	2,500	130	120,000	4,860
Striped bass	71,000	8,475					16,200	1,532
Sturgeon			800	80				
White perch	14,000	440						
Total	1,306,500	53,635	946,475	27,097	522,500	12,470	1,126,755	47,181

Fisheries of North Carolina, 1932—Continued

CATCH: BY GEAR—Continued

Species	Lines							
	Hand		Troll		Trot with baits or snoods		Trot with hooks	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Bluefish	5,700	$264	3,500	$70				
Catfish and bullheads							18,000	$520
Cero			13,000	520				
Sea bass	100,600	3,080						
Spanish mackerel	1,000	40	39,000	1,560				
Striped bass							11,760	1,171
Crabs, hard					1,847,600	$18,448		
Total	107,300	3,384	55,500	2,150	1,847,600	18,448	29,760	1,691

Species	Pound nets		Weirs		Wheels		Fyke nets	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives	4,591,000	$25,052			263,000	$1,505	21,000	$165
Black bass							4,768	477
Bluefish	13,500	445						
Bowfin							500	5
Butterfish	21,500	230						
Carp	13,300	244	2,000	$20			28,100	1,561
Catfish and bullheads	45,500	1,215					97,900	2,048
Croaker	892,000	8,920						
Drum, red or redfish	38,000	760						
Eels	2,500	100					2,200	48
Flounders	527,600	23,220					5,800	229
Gizzard shad	4,500	45					3,000	30
Harvestfish or "starfish"	977,981	10,859						
Hickory shad	68,425	2,488						
King whiting or "kingfish"	4,500	90						
Mullet	4,500	175					300	12
Pike or pickerel							1,200	73
Shad	400,525	55,833					500	60
Sheepshead	2,250	45						
Spanish mackerel	12,500	750						
Spot	191,500	1,940						
Squeteagues or "sea trout":								
Gray	2,503,000	37,310						
Spotted	25,200	1,108						
Striped bass	75,200	9,115					21,000	2,125
Suckers	300	6					150	3
Sunfish							5,150	103
White perch	92,600	3,438					45,000	1,165
Yellow perch	4,400	132					39,750	897
Total	10,512,281	183,520	2,000	20	263,000	1,505	276,318	9,001

Species	Dip nets		Otter trawls				Pots	
			Fish		Shrimp		Eel	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Bluefish			91	$7				
Butterfish			1,014	23				
Croaker			151,856	2,671				
Eels			437	9			51,228	$1,712
Flounders			51,317	1,538	24,000	$520		
Hake			1,624	22				
Hogfish			992	12				
King whiting or "kingfish"			1,848	39	30,000	450		
Scup			5,615	172				
Sea bass			41,895	1,071				
Squeteagues or "sea trout", gray			10,423	309				
Sturgeon			261	39				
Crabs, soft	112,964	$12,424						
Shrimp					292,104	9,393		
Squid			763	13				
Total	112,964	12,424	268,136	5,925	346,104	10,363	51,228	1,712

Fisheries of North Carolina, 1932—Continued

CATCH: BY GEAR—Continued

Species	Pots—Contd.		Spears		Dredges			
	Fish				Oyster		Scallop	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Flounders			23,000	$990				
White perch	217,500	$4,350						
Oysters:								
Market, public, spring					312,202	$11,309		
Market, public, fall					275,952	11,289		
Market, private, spring					2,600	100		
Scallops, bay							27,006	$1,800
Terrapin, diamond-back	1,000	250						
Total	218,500	4,600	23,000	990	590,754	22,698	27,006	1,800

Species	Tongs		Rakes		By hand	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Clams, hard, public	3,200	$200	247,424	$16,078	10,000	$1,000
Oysters:						
Market, public, spring	283,756	12,233			30,504	1,525
Market, public, fall	267,382	13,317			20,144	1,007
Market, private, spring	7,616	459				
Market, private, fall	1,200	100				
Scallops, bay			64,452	4,760		
Total	563,154	26,309	311,876	20,838	60,648	3,532

SEED OYSTER FISHERY: BY GEAR

Item	Oyster dredges	
OPERATING UNITS	*Number*	
Fishermen: On boats and shore—Regular	12	
Boats: Motor	6	
Apparatus: Number	12	
Yards at mouth	12	
CATCH	*Bushels*	*Value*
Oysters, seed, public, spring	39,741	$8,280

NOTE.—Of the persons and gear employed in the seed oyster fishery all are duplicated among those in the market oyster fishery or fisheries for other species.

SOUTH CAROLINA

Fisheries of South Carolina, 1932

OPERATING UNITS: BY GEAR

Item	Haul seines	Gill nets: Anchor	Gill nets: Drift	Gill nets: Runaround	Lines: Hand	Lines: Trot with baits or snoods
	Number	*Number*	*Number*	*Number*	*Number*	*Number*
Fishermen:						
On vessels					10	
On boats and shore:						
Regular	10	28	60	12	140	6
Casual	138	152	586		30	
Total	148	180	646	12	180	6
Vessels, motor					2	
Net tonnage					20	
Boats:						
Motor		22	15	3	14	
Other	20	122	308		58	6
Apparatus:						
Number	20	324	323	7	180	6
Length, yards	2,780					
Square yards		154,872	284,554	1,450		
Hooks, baits, or snoods					550	4,500

Item	Otter trawls	Spears	Tongs	Grabs	By hand	Total, exclusive of duplication
	Number	*Number*	*Number*	*Number*	*Number*	*Number*
Fishermen:						
On vessels	7					17
On boats and shore:						
Regular	52	6		323	30	616
Casual			6	10	10	843
Total	59	6	6	333	40	1,475
Vessels, motor	2					4
Net tonnage	39					59
Boats:						
Motor	26			7		84
Other		6	3	311	36	773
Apparatus:						
Number	28	6	6	333		
Yards at mouth	560					

CATCH: BY GEAR

Species	Haul seines		Gill nets: Anchor		Gill nets: Drift		Gill nets: Runaround	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Drum, red or redfish	3,170	$108						
Flounders	1,575	79						
Hickory shad			5,172	$414	5,894	$472		
King whiting or "kingfish"	3,810	190					2,000	$100
Mullet	134,050	5,512					14,000	530
Shad			61,541	7,670	61,495	7,789		
Spot	8,000	320					2,000	80
Squeteagues or "sea trout":								
Gray	960	58						
Spotted	1,855	148						
Sturgeon			19,590	3,134	3,750	600		
Terrapin, diamond-back	712	182						
Total	154,132	6,597	86,303	11,218	71,139	8,861	18,000	710

Fisheries of South Carolina, 1932—Continued

CATCH: BY GEAR—Continued

Species	Lines, Hand, Pounds	Lines, Hand, Value	Lines, Trot with baits or snoods, Pounds	Lines, Trot with baits or snoods, Value	Otter trawls, Pounds	Otter trawls, Value	Spears, Pounds	Spears, Value
Bluefish	4,062	$325						
Flounders	850	48			750	$37	2,000	$120
Grunts	6,800	220						
King whiting or "kingfish"	5,400	195			5,000	125		
Sea bass	218,750	8,187						
Sharks	8,000	80						
Squeteagues or "sea trout":								
Gray	1,500	90						
Spotted	12,500	900						
Crabs, hard			16,000	$320				
Shrimp					1,500,687	32,529		
Octopus	1,200	72						
Total	258,562	10,117	16,000	320	1,506,437	32,691	2,000	120

Species	Tongs, Pounds	Tongs, Value	Grabs, Pounds	Grabs, Value	By hand, Pounds	By hand, Value
Clams, hard, public					4,800	$600
Oysters:						
Market, public, spring			1,205,281	$21,547	605	22
Market, public, fall			475,299	10,157	405	18
Market, private, spring	22,808	$702	404,852	8,884	1,800	60
Market, private, fall	6,669	296	298,962	10,112	1,160	58
Terrapin, diamond-back					1,074	301
Total	29,477	998	2,384,394	50,700	9,844	1,059

GEORGIA

Fisheries of Georgia, 1932

OPERATING UNITS: BY GEAR

Item	Purse seines, menhaden	Haul seines	Gill nets, Anchor	Gill nets, Drift	Gill nets, Run-around	Gill nets, Stake	Lines, Hand	Lines, Trot with baits or snoods	Lines, Trot with hooks
	Number	Number	Number	Number	Number	Number	Number	Number	Number
Fishermen:									
On vessels	50								
On boats and shore:									
Regular					18	4	3	30	
Casual		28	50	316		40	40	1	40
Total	50	28	50	316	18	44	43	31	40
Vessels, motor	2								
Net tonnage	108								
Boats:									
Motor				3	10		1		
Other		14	45	158	8	20	10	31	40
Accessory boats	4								
Apparatus:									
Number	2	11	45	158	10	40	43	31	40
Length, yards	600	1,105							
Square yards			10,625	111,863	3,170	10,050			
Hooks, baits, or snoods							46	9,390	2,840

Fisheries of Georgia, 1932—Continued

OPERATING UNITS: BY GEAR—Continued

Item	Cast nets	Otter trawls	Pots		Tongs	Rakes	Grabs	By hand	Total, exclusive of duplication
			Crab	Fish					
	Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Fishermen:									
On vessels		36							86
On boats and shore:									
Regular	4	214	12		84		60	62	427
Casual	6			22	42	4		36	539
Total	10	250	12	22	126	4	60	98	1,052
Vessels, motor		18							20
Net tonnage		137							245
Boats:									
Motor		107							119
Other	4		12	11	111	4	60	92	523
Accessory boats									4
Apparatus:									
Number	10	125	12	81	120	4	60		
Yards at mouth		2,510							

CATCH: BY GEAR

Species	Purse seines, menhaden		Haul seines		Gill nets			
					Anchor		Drift	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Hickory shad					791	$47	6,899	$488
Menhaden	11,520,000	$16,000						
Shad					45,708	6,969	229,972	36,272
Squeteagues or "sea trout":								
Gray					2,000	120		
Spotted					16,000	1,120		
Sturgeon							4,965	397
Terrapin, diamond-back			9,645	$1,356				
Total	11,520,000	16,000	9,645	1,356	64,499	8,256	241,836	37,157

Species	Gill nets—Continued				Lines			
	Runaround		Stake		Hand		Trot with baits or snoods	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Croaker	8,226	$329						
Drum, red or redfish	2,141	107						
Eels							550	$22
Flounders	2,455	74						
Hickory shad			2,151	$172				
King whiting or "kingfish"	8,646	284			2,142	$64		
Mullet	20,165	930						
Sea bass					32,600	960		
Shad			12,465	1,870				
Spot	9,542	351						
Squeteagues or "sea trout" spotted	15,514	1,181			2,696	216		
Crabs, hard							170,467	2,558
Total	66,689	3,256	14,616	2,042	36,838	1,240	171,017	2,580

Fisheries of Georgia, 1932—Continued

CATCH: BY GEAR—Continued

Species	Lines—Cont.: Trot with hooks		Cast nets		Otter trawls		Pots: Crabs		Pots: Fish	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Catfish and bullheads	29,667	$1,718							68,722	$4,123
Flounders					449	$14				
King whiting or "king-fish"					8,958	269				
Mullet			32,462	$974						
Squeteagues or "sea trout", spotted			12,000	840						
Crabs, hard							55,025	$825		
Shrimp					3,601,564	89,547				
Total	29,667	1,718	44,462	1,814	3,610,971	89,830	55,025	825	68,722	4,123

Species	Tongs		Rakes		Grabs		By hand	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Clams, hard, public			600	$75				
Oysters:								
Market, private, spring	76,467	$2,264			283,090	$4,927	53,564	$1,598
Market, private, fall	101,687	4,056			25,670	906	47,930	1,919
Total	178,154	6,320	600	75	308,760	5,833	101,494	3,517

FLORIDA

Fisheries of Florida, 1932

OPERATING UNITS: BY GEAR

Item	Purse seines: Menhaden	Purse seines: Other	Haul seines: Common	Haul seines: Long	Gill nets: Anchor	Gill nets: Drift	Gill nets: Run-around	Gill nets: Stake	Trammel nets
	Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Fishermen:									
On vessels	128	10							
On boats and shore:									
Regular			495	239	6	103	2,212		241
Casual			67			98	249	5	18
Total	128	10	562	239	6	201	2,461	5	259
Vessels.									
Motor	5	1							
Net tonnage	296	11							
Boats:									
Motor			97	82	2	53	993		108
Other			73	168		76	1,590	5	132
Accessory boats	4								
Apparatus:									
Number	5	1	110	76	12	146	2,111	5	182
Length, yards	1,450	400	34,300	59,200					
Square yards					9,600	139,606	2,110,492	1,250	122,469

Fisheries of Florida, 1932—Continued

OPERATING UNITS: BY GEAR—Continued

Item	Lines				Pound nets	Stop nets	Fyke nets	Dip nets	
	Hand	Troll	Trot with baits or snoods	Trot with hooks				Common	Drop
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels	400								
On boats and shore:									
Regular	739	778	14	197	16	52	18	35	30
Casual	484	359		5			8	15	21
Total	1,623	1,137	14	202	16	52	26	50	51
Vessels:									
Motor	53								
Net tonnage	1,773								
Sail	1								
Net tonnage	64								
Total vessels	54								
Total net tonnage	1,837								
Boats:									
Motor	352	552	4	28	6	12		24	30
Other	430	70	10	140	7	29	26	34	12
Accessory boats	7								
Apparatus:									
Number	1,620	1,190	13	198	13	7	278	50	54
Square yards						11,475			
Hooks, baits, or snoods	2,573	1,485	2,700	85,005					

Item	Cast nets	Otter trawls		Pots				Spears
		Fish	Shrimp	Crab	Eel	Fish	Sea crawfish	
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels		10	107					
On boats and shore:								
Regular	6		795	42	2	36	44	5
Casual	10		8	2			24	22
Total	16	10	910	44	2	36	68	27
Vessels:								
Motor		4	41					
Net tonnage		109	433					
Boats:								
Motor	3		335	24	2	12	42	
Other	7			14		17	19	
Apparatus:								
Number	16	4	376	1,433	40	1,515	3,190	27
Yards at mouth		109	7,135					

Fisheries of Florida, 1932—Continued

OPERATING UNITS: BY GEAR—Continued

Item	Dredges: Clam	Dredges: Oyster	Tongs	Forks	Coquina scoops	Hooks, sponge	Diving outfits	By-hand	Total, exclusive of duplication
	Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Fishermen:									
On vessels		4							638
On boats and shore:									
Regular	12		356	34		402	404	55	5,988
Casual			48	6	4			164	1,331
Total	12	4	404	40	4	402	404	219	7,957
Vessels:									
Motor		1							98
Net tonnage		7							2,467
Sail									1
Net tonnage									64
Total vessels		1							99
Total net tonnage		7							2,531
Boats:									
Motor			123				54		2,318
Other			175	4		325		34	2,945
Accessory boats									11
Apparatus:									
Number	1	2	413	40	3	201	54		
Yards at mouth		2							

CATCH: BY GEAR

Species	Purse seines: Menhaden		Purse seines: Other		Haul seines: Common		Haul seines: Long	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives							72,661	$364
Black bass					10,000	$600	243,007	16,359
Bluefish			8,000	$320	141,416	3,000		
Blue runner or hardtail					20,868	204		
Catfish and bullheads					6,923	178	2,412,065	74,487
Cigarfish					9,350	170		
Crappie					12,000	360	386,596	11,879
Crevalle					1,320	15		
Croaker					3,685	44		
Drum:								
Black					9,620	187		
Red or redfish					81,233	1,237		
Flounders					10,275	297		
Hickory shad							20,887	217
Kingfish or "king mackerel"					17,440	317		
King whiting or "kingfish"					16,436	318		
Ladyfish					2,622	39		
Menhaden	23,328,960	$40,931			20,900	289		
Mojarro					1,820	25		
Mullet			209,061	5,249	3,006,193	49,919	1,899	45
Permit					1,450	23		
Pigfish					5,358	62		
Pinfish or sailors choice					5,775	148		
Pompano					44,629	5,772		
Shad					124,650	9,970	203,327	16,266
Sheepshead					36,011	522		
Snapper, mangrove					6,016	82		
Snook or sergeantfish					41,805	546		
Spanish mackerel			362,027	14,481	876,113	10,339		
Spot					3,560	51		
Squeteagues or "sea trout":								
Gray					6,611	77		
Spotted					189,301	7,184		
Sunfish					6,500	130	651,854	16,577
Tenpounder					76,200	1,324		
Turtles, soft-shell					235	5	43,730	247
Total	23,328,960	40,931	579,088	20,050	4,296,315	93,524	4,036,026	135,941

Fisheries of Florida, 1932—Continued

CATCH: BY GEAR—Continued

Species	Gill nets							
	Anchor		Drift		Runaround		Stake	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Bluefish			17,286	$629	965,489	$41,986		
Blue runner or hardtail					128,256	1,744		
Catfish and bullheads					7,930	169		
Crevalle					18,985	437		
Croaker					14,460	285		
Drum:								
Black					34,960	530		
Red or redfish					502,930	8,164		
Flounders					36,217	921		
Groupers					33,630	653		
Hickory shad			7,260	290				
King whiting or "kingfish"			8,220	164	34,770	925		
Mojarro					23,491	349		
Mullet			135,000	2,700	16,471,235	258,588		
Muttonfish					82,340	2,628		
Pigfish					58,590	854		
Pinfish or sailors choice					19,200	337		
Pompano			940	141	303,668	46,341		
Shad			212,684	25,890			5,425	$814
Sharks	5,040,000	$12,000						
Sheepshead					367,559	6,029		
Snapper:								
Mangrove					40,461	775		
Red					17,000	425		
Snook or sergeantfish					127,845	2,204		
Spanish mackerel			74,575	2,237	5,385,248	177,204		
Spot					63,700	859		
Squeteagues or "sea trout", spotted			4,000	200	1,750,240	68,720		
Sturgeon			4,379	199				
Tenpounder					1,645	25		
Total	5,040,000	12,000	464,344	32,450	26,489,849	621,152	5,425	814

Species	Trammel nets		Lines					
			Hand		Troll		Trot with baits or snoods	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Amberjack			4,577	$122				
Barracuda			4,245	180				
Black bass			18,050	1,040				
Bluefish			117,977	6,107	152,637	$7,623		
Blue runner or hardtail			6,321	235				
Cabio or crab eater			4,300	86				
Catfish and bullheads			476,096	19,043				
Cero					275	4		
Crevalle			2,061	62				
Dolphin			300	9	11,750	352		
Drum:								
Black	165	$3	2,990	93				
Red or redfish	16,750	302	134,803	1,766				
Flounders	365	12						
Groupers			3,108,523	63,302				
Grunts			19,750	567				
Hogfish			20,000	600				
Jewfish			29,080	1,012				
Kingfish or "king mackerel"					3,276,281	119,204		
King whiting or "kingfish"			2,000	100				
Mullet	581,397	11,330						
Muttonfish			102,570	5,271				
Pompano	211,058	24,520	12,121	2,374				
Porgies			25,636	509				
Porkfish			363	7				
Sea bass			43,200	1,964	2,521	101		
Sharks			3,000	5				
Sheepshead	7,530	135	100,027	1,413				
Snapper:								
Mangrove	990	18	33,906	918				
Red			4,557,015	227,321				
Snook or sergeantfish			111,420	3,567				
Spanish mackerel			11,750	344	99,885	4,391		
Squeteagues or "sea trout":								
Gray	880	16	2,860	38				
Spotted	131,093	5,690	489,851	20,751				

Fisheries of Florida, 1932—Continued

CATCH: BY GEAR—Continued

Species	Trammel nets		Lines					
			Hand		Troll		Trot with baits or snoods	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Tripletail			890	$18				
Tuna or "horse mackerel"					3,350	$134		
Wahoo					2,250	90		
Yellowtail			84,580	4,004				
Crabs, hard							62,220	$3,025
Turtles, soft-shell			7,050	70				
Total	950,228	$42,026	9,536,812	362,898	3,548,949	131,899	62,220	3,025

Species	Lines—Cont'd.		Pound nets		Stop nets		Fyke nets	
	Trot with hooks							
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives			7,286	$73				
Bluefish			17,211	782	440	$16		
Blue runner or hardtail			7,062	128				
Cabio or crab eater			845	17				
Catfish and bullheads	275,730	$12,272	159,910	4,389			57,432	$1,149
Crevalle					385	4		
Croaker					3,960	45		
Drum:								
Black					275	4		
Red or redfish			6,820	124	22,748	301		
Flounders					6,950	142		
Groupers			350	7				
Jewfish			1,210	22				
Kingfish or "king mackerel"			780	23				
King whiting or "kingfish"					3,300	37		
Mojarro					9,053	103		
Mullet					710,939	9,828		
Permit					1,400	84		
Pigfish					2,600	32		
Pompano			167	17	8,680	922		
Porgies			150	3				
Sheepshead			1,320	24	22,883	333		
Snapper, mangrove			352	6	2,300	30		
Snook or sergeantfish					10,725	121		
Spanish mackerel			28,000	840				
Spot					1,100	15		
Squeteagues or "sea trout":								
Gray					715	8		
Spotted			18,700	850	83,340	3,030		
Turtles, soft-shell			654	14				
Total	275,730	12,272	250,817	7,319	891,793	15,055	57,432	1,149

Species	Dip nets				Cast nets		Otter trawls	
	Common		Drop				Fish	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Bluefish							777	$61
Butterfish							997	47
Cod							2,039	43
Croaker							3,670	57
Eels							1,260	27
Flounders							306,726	8,580
Hake							8,218	165
King whiting or "kingfish"							133	5
Mojarro					1,225	$37		
Mullet					25,725	595		
Scup							247,792	5,936
Sea bass							205,274	6,037
Squeteagues or "sea trout", gray							10,352	537
Crabs, hard			3,675	$63				
Sea crawfish or spiny lobster	76,380	$4,583	93,007	7,441				
Squid							7,553	147
Total	76,380	4,583	96,682	7,504	26,950	632	794,791	21,642

Fisheries of Florida, 1932—Continued

CATCH: BY GEAR—Continued

Species	Otter trawls—Continued		Pots					
	Shrimp		Crab		Eel		Fish	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Black bass							7,420	$519
Catfish and bullheads							135,550	4,527
Crappie							6,330	127
Eels					6,300	$126		
Flounders	74,000	$1,490						
Groupers	375	8					21,000	630
Grunts							24,641	730
Hogfish							8,430	253
King whiting or "kingfish"	220,200	5,330						
Muttonfish							18,225	912
Snapper:								
Mangrove							11,555	578
Red	1,250	10					13,000	780
Snook or sergeantfish							9,985	499
Sunfish							4,140	124
Turbot							4,125	124
Yellowtail							7,290	437
Crabs:								
Hard			16,287	$431				
Stone			153,825	8,335				
Shrimp	18,136,334	535,198						
Total	18,432,159	542,036	170,112	8,766	6,300	126	271,691	10,240

Species	Pots—Contd.		Spears		Dredges			
	Sea crawfish				Clam		Oyster	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Flounders			20,598	$923				
Sea crawfish or spiny lobster	276,160	$20,054						
Clams, hard, public					844,264	$31,660		
Oysters:								
Market, private, spring							28,186	$1,244
Market, private, fall							1,275	56
Total	276,160	20,054	20,598	923	844,264	31,660	29,461	1,300

Species	Tongs		Forks		Coquina scoops	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Clams:						
Coquina					5,400	$335
Hard, public			275,940	$11,021		
Oysters:						
Market, public, spring	527,738	$26,758				
Market, public, fall	592,137	34,070				
Market, private, spring	44,132	1,833				
Market, private, fall	31,040	1,558				
Total	1,195,047	64,219	275,940	11,021	5,400	335

Species	Hooks, sponge		Diving outfits		By hand	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Conchs	1,500	$120			608	$61
Oysters:						
Market, public, spring					14,700	735
Market, public, fall					67,578	1,598
Market, private, spring					114,240	4,809
Market, private, fall					81,180	4,706
Scallops, bay					61,965	6,885
Sponges:						
Grass	168,432	34,392	12,935	$2,927		
Sheepswool	117,877	185,544	159,210	408,130		
Velvet	71	20				
Wire	277	97	29,189	13,200		
Yellow	47,046	14,794	77,490	37,730		
Total	335,203	234,967	278,824	462,077	340,271	18,794

Fisheries of Florida, 1932—Continued

CATCH: BY DISTRICTS

Species	East coast		West coast		Lake Okeechobee	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives	79,947	$437				
Amberjack	3,077	92	1,500	$30		
Barracuda	4,245	180				
Black bass	103,869	7,006			174,608	$11,512
Bluefish	906,711	44,652	514,522	15,962		
Blue runner or hardtail	41,216	861	121,291	1,450		
Butterfish	997	47				
Cabio or crab eater			5,145	103		
Catfish and bullheads	2,713,184	80,851	89,478	1,840	728,974	33,523
Cero			275	4		
Cigarfish			9,350	170		
Cod	2,039	43				
Crappie	234,418	8,455			170,508	3,411
Crevalle	20,166	491	2,585	27		
Croaker	17,195	328	8,580	103		
Dolphin	12,050	361				
Drum:						
Black	43,500	751	4,510	66		
Red or redfish	45,880	1,246	718,904	10,648		
Eels	7,560	153				
Flounders	392,726	10,390	62,405	1,975		
Groupers	136,465	3,758	3,027,413	60,842		
Grunts	32,891	977	11,500	320		
Hake	8,218	165				
Hickory shad	28,147	507				
Hogfish	28,430	853				
Jewfish	20,000	800	10,290	234		
Kingfish or "king mackerel"	2,705,775	105,159	588,726	14,385		
King whiting or "kingfish"	279,873	6,815	5,186	65		
Ladyfish			2,622	39		
Menhaden	11,179,680	13,319	12,170,180	27,901		
Mojarro	6,225	137	20,364	377		
Mullet	2,278,890	42,682	18,862,559	295,572		
Muttonfish	195,585	8,596	7,550	215		
Permit			2,850	107		
Pigfish	42,740	662	23,808	286		
Pinfish or sailors choice	23,525	467	1,450	18		
Pompano	253,978	42,850	327,285	37,237		
Porgies	661	20	25,125	492		
Porkfish			363	7		
Scup	247,792	5,936				
Sea bass	247,795	8,038	3,200	64		
Shad	546,086	52,940				
Sharks			5,043,000	12,005		
Sheepshead	80,020	1,941	455,310	6,515		
Snapper:						
Mangrove	28,254	1,290	67,326	1,117		
Red	48,800	2,006	4,539,465	226,530		
Snook or sergeantfish	134,152	4,911	167,628	2,025		
Spanish mackerel	3,452,550	135,989	2,885,048	73,847		
Spot	65,120	879	3,240	40		
Squeteagues or "sea trout":						
Gray	10,352	537	11,066	139		
Spotted	527,845	24,497	2,139,180	81,028		
Sturgeon			4,379	199		
Sunfish	404,314	9,575			258,180	7,256
Tenpounder			77,846	1,349		
Tripletail			890	18		
Turbot	4,125	124				
Tuna or "horse mackerel"	3,350	134				
Wahoo	2,250	90				
Yellowtail	42,290	2,537	49,680	1,004		
Crabs:						
Hard	78,507	3,456	3,675	63		
Stone	42,155	2,951	111,670	5,384		
Sea crawfish or spiny lobster	347,207	26,177	98,340	5,901		
Shrimp	17,068,073	503,925	1,068,261	31,273		
Clams:						
Coquina	4,200	35	1,200	300		
Hard, public	12,000	750	1,108,812	41,992		
Conchs			1,500	120		
Oysters:						
Market, public, spring	43,666	3,237	498,772	24,256		
Market, public, fall	79,111	2,329	580,604	33,339		
Market, private, spring	158,372	6,642	28,186	1,244		
Market, private, fall	112,220	6,264	1,275	56		
Scallops, bay			61,965	6,885		
Squid	7,553	147				
Turtles, soft-shell	12,827	128	889	19	37,953	189

Fisheries of Florida, 1932—Continued

CATCH: BY DISTRICTS—Continued

Species	East coast		West coast		Lake Okeechobee	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Sponges:						
Grass			181,367	$37,319		
Sheepswool			277,087	593,674		
Velvet			71	20		
Wire			29,466	13,387		
Yellow			124,536	52,524		
Total	46,660,349	$1,191,576	56,259,649	1,725,917	1,370,223	$55,891

Sponge fishery of Florida, 1932

OPERATING UNITS: BY GEAR

Item	Sponge hooks	Diving outfits	Total
	Number	*Number*	*Number*
Fishermen, on boats and shore, regular	402	404	806
Boats:			
Motor		54	54
Other	325		325
Apparatus	201	54	

CATCH: BY GEAR

Sponges	Sponge hooks		Diving outfits		Total	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Grass	168,432	$34,392	12,935	$2,927	181,367	$37,319
Sheepswool	117,877	185,544	159,210	408,130	277,087	593,674
Velvet	71	20			71	20
Wire	277	97	29,189	13,290	29,466	13,387
Yellow	47,046	14,794	77,490	37,730	124,536	52,524
Total	333,703	234,847	278,824	462,077	612,527	696,924

SPONGES SOLD AT THE EXCHANGE, TARPON SPRINGS, FLA.

During 1932 sponges handled on the exchange at Tarpon Springs, Fla., amounted to 418,923 pounds, valued at $517,655. This is an increase of 12 percent in quantity but a decrease of 15 percent in value as compared with the quantity and value of the transactions on the exchange during 1931. Of the total sponges sold on the exchange in 1932, 109,810 pounds, valued at $312,318, were large wool; 60,429 pounds, valued at $118,336, were medium, small, and rag wool; 90,144 pounds, valued at $44,437, were yellow; 129,352 pounds, valued at $29,273, were grass; and 29,188 pounds, valued at $13,291, were wire. It is estimated that sponges valued at $60,000 were sold outside of the exchange.

ALABAMA

Fisheries of Alabama, 1932

OPERATING UNITS: BY GEAR

Item	Haul seines	Gill nets, stake	Trammel nets	Lines: Hand	Lines: Troll	Lines: Trot with bait or snoods	Lines: Trot with hooks
	Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Fishermen:							
On vessels				99			
On boats and shore:							
Regular	30	4	60	14	2	6	18
Casual			9	36		13	6
Total	30	4	69	149	2	19	24
Vessels, motor				11			
Net tonnage				132			
Boats:							
Motor	6	1	23	3	1		3
Other	3	4	54	18		13	24
Apparatus:							
Number	5	18	53	149	2	15	101
Length, yards	2,900						
Square yards		2,880	17,365				
Hooks, baits, or snoods				260	2	2,336	10,370

Item	Fyke nets	Otter trawls	Spears	Tongs	By hand	Total, exclusive of duplication
	Number	*Number*	*Number*	*Number*	*Number*	*Number*
Fishermen:						
On vessels		34		22		139
On boats and shore:						
Regular	1	190	4	115	6	360
Casual			26	5	28	90
Total	1	224	30	142	34	589
Vessels, motor		17		11		31
Net tonnage		145		82		299
Boats:						
Motor	1	95		42		153
Other				38		151
Apparatus:						
Number	6	112	30	142		
Yards at mouth		1,465				

CATCH: BY GEAR

Species	Haul seines		Gill nets, stake		Trammel nets		Lines: Hand	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Bluefish	9,486	$431			2,915	$132		
Blue runner or hardtail	924	17						
Catfish and bullheads					1,006	45	1,980	$90
Crevalle	259	5						
Croaker	8,706	159			9,185	167	220	4
Drum:								
Black	302	6			440	8		
Red or redfish	5,326	340			32,080	1,906	6,886	399
Flounders	110	8			3,890	271		
Groupers							99,746	1,998
King whiting or "kingfish"	3,031	55			632	12	55	1
Mullet	164,614	2,470			532,344	8,203		
Pompano	5	1			3,139	435		
Sheepshead	344	9			2,942	80	1,155	31
Snapper, red							681,573	30,263
Spanish mackerel	493	18			7,535	274		
Spot	165	3			236	4		
Squeteagues or "sea trout":								
Gray	660	12			3,685	67	1,705	31
Spotted	9,337	849			84,804	7,710	9,083	833
Sturgeon			10,742	$977				
Tenpounder	1,400	14						
Total	205,162	4,397	10,742	977	684,833	19,314	802,403	33,650

Fisheries of Alabama, 1932—Continued

CATCH BY GEAR—Continued

Species	Lines—Continued						Fyke nets	
	Troll		Trot with baits or snoods		Trot with hooks			
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Buffalofish					10,509	$287	1,320	$36
Cabio or crab eater	550	$15						
Catfish and bullheads					46,775	2,126	10,450	475
Kingfish or "king mackerel"	880	40						
Paddlefish or spoonbill cat					1,320	60		
Crabs, hard			70,070	$982				
Total	1,430	55	70,070	982	58,604	2,473	11,770	511

Species	Otter trawls		Spears		Tongs		By hand	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Flounders			17,490	$1,389				
Crabs, soft							1,280	$236
Shrimp	3,381,700	$71,910						
Oysters:								
Market, public, spring					748,952	$27,216		
Market, public, fall					88,485	3,892		
Market, private, spring					3,960	220		
Market, private, fall					17,820	990		
Terrapin, diamond-back							1,089	275
Frogs							697	104
Total	3,381,700	71,910	17,490	1,389	859,217	32,318	3,066	615

MISSISSIPPI

Fisheries of Mississippi, 1932

OPERATING UNITS: BY GEAR

Item	Haul seines	Trammel nets	Lines		Dip nets, drop	Cast nets
			Hand	Trot with baits or snoods		
	Number	*Number*	*Number*	*Number*	*Number*	*Number*
Fishermen:						
On vessels			6			
On boats and shore:						
Regular	18	64	12	23		
Casual		2	114	13	35	60
Total	18	66	132	36	35	60
Vessels:						
Motor			1			
Net tonnage			8			
Boats:						
Motor	3	25	8	3		
Other	3	43	108	34	16	
Apparatus:						
Number	3	39	132	36	130	60
Length, yards	800					
Square yards		15,775				
Hooks, baits, or snoods			142	8,895		

Fisheries of Mississippi, 1932—Continued

OPERATING UNITS: BY GEAR—Continued

Item	Otter trawls	Spears	Dredges, oyster	Tongs	By hand	Total, exclusive of duplication
	Number	*Number*	*Number*	*Number*	*Number*	*Number*
Fishermen:						
On vessels	60		424			474
On boats and shore:						
Regular	450	2	236	240		829
Casual		61		5	33	205
Total	510	63	660	245	33	1,508
Vessels:						
Motor	30		91			114
Net tonnage	276		1,300			1,507
Sail			15			15
Net tonnage			237			237
Total vessels	30		106			129
Total net tonnage	276		1,537			1,744
Boats:						
Motor	225		53	9		268
Other			5	231		407
Apparatus:						
Number	255	63	328	245		
Yards at mouth	3,154		329			

CATCH: BY GEAR

Species	Haul seines		Trammel nets		Lines			
					Hand		Trot with baits or snoods	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Bluefish	1,320	$24	3,410	$62				
Cabio or crab eater					110	$2		
Catfish and bullheads			12,705	231	14,410	262		
Crevalle	660	6	110	1	220	2		
Croaker			5,775	99	4,620	84		
Drum:								
Black	440	4	7,425	97	1,072	14		
Red or redfish	6,600	180	60,910	1,672	7,590	210		
Flounders			9,080	350				
Groupers					16,117	322		
King whiting or "kingfish"			2,068	33				
Mullet	60,000	600	483,720	7,210				
Pompano			132	12				
Sheepshead	6,600	150	15,400	355	1,815	34		
Snapper, red					36,812	1,841		
Squeteagues or "sea trout":								
Gray	10,450	190	50,600	920	41,965	763		
Spotted	11,000	400	69,108	2,513	44,286	1,611		
Tenpounder	350	4						
Tripletail					176	4		
Crabs, hard							261,895	$3,838
Shrimp	7,560	144						
Total	104,980	1,702	720,443	13,555	169,193	5,149	261,895	3,833

Species	Dip nets, drop		Cast nets		Otter trawls		Spears	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Croaker					440	$8		
Flounders					8,600	344	28,860	$1,435
King whiting or "kingfish"					660	12		
Mullet			21,250	$425				
Crabs, hard	58,212	$832						
Shrimp			9,000	900	13,993,160	266,384		
Total	58,212	832	30,250	1,325	14,002,860	266,748	28,860	1,435

Fisheries of Mississippi, 1932—Continued

CATCH: BY GEAR—Continued

Species	Dredges, oyster		Tongs		By hand	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Crabs, soft					3,572	$893
Oysters:						
Market, public, spring	4,376,770	$164,601	95,588	$5,182		
Market, public, fall	601,770	24,140	148,192	8,022		
Total	4,978,540	188,741	243,780	13,204	3,572	893

LOUISIANA

Fisheries of Louisiana, 1932

OPERATING UNITS: BY GEAR

Item	Haul seines	Trammel nets	Lines: Hand	Lines: Trot with baits or snoods	Lines: Trot with hooks	Dip nets, drop
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On boats and shore:						
Regular	412	48	46	183	3	8
Casual	4		121	135		24
Total	416	48	167	318	3	32
Boats:						
Motor	99	22	21	22	3	10
Other	102	22	125	279		26
Apparatus:						
Number	102	23	167	318	3	1,520
Length, yards	13,434					
Square yards		6,985				
Hooks, baits, or snoods			172	60,025	800	

Item	Cast nets	Otter trawls	Dredges, oyster	Tongs	By hand	Total, exclusive of duplication
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels		108	50			154
On boats and shore:						
Regular	3	844	8	463	68	1,864
Casual	15			2	106	289
Total	18	952	58	465	174	2,307
Vessels:						
Motor		54	10			62
Net tonnage		372	93			447
Sail			2			2
Net tonnage			38			38
Total vessels		54	12			64
Total net tonnage		372	131			485
Boats:						
Motor		422	2	3		574
Other				462		996
Apparatus:						
Number	18	476	26	465		
Yards at mouth		5,942	26			

Fisheries of Louisiana, 1932—Continued

CATCH: BY GEAR

Species	Haul seines		Trammel nets		Lines			
					Hand		Trot with baits or snoods	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Catfish and bullheads	10,900	$361	13,050	$430	18,450	$694		
Crevalle	200	6	100	3				
Croaker	26,550	1,204	11,820	486	6,100	234		
Drum:								
Black	25,450	837	34,662	1,049	27,300	818		
Red or redfish	88,650	4,761	87,009	4,428	106,080	5,304		
Flounders	1,030	72	3,375	242				
Garfish			300	15				
Groupers					3,400	68		
Jewfish					2,400	48		
King whiting or "kingfish"	7,850	196	8,150	178				
Mullet	2,600	78	300	9				
Pompano	90	11						
Sheepshead	28,150	1,487	33,023	1,707	16,500	825		
Snapper, red					66,884	4,013		
Spanish mackerel					400	16		
Spot	1,850	44	1,600	43				
Squeteagues or "sea trout":								
Gray	59,080	1,763	84,361	2,529	77,030	2,311		
Spotted	122,057	9,477	134,318	10,561	156,052	11,569		
Tripletail			890	45	100	4		
Crabs, hard							5,730,587	$54,904
Shrimp	2,590,040	54,553						
Turtles, loggerhead	6,450	129						
Total	2,970,947	74,979	412,958	21,725	480,696	25,904	5,730,587	54,904

Species	Lines—Cont'd		Dip nets, drop		Cast nets		Otter trawl	
	Trot with hooks							
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Catfish and bullheads	2,450	$98						
Mullet					3,400	$68		
Crabs, hard			147,150	$1,872				
Shrimp					3,870	155	35,501,870	$745,744
Total	2,450	98	147,150	1,872	7,270	223	35,501,870	745,744

Species	Dredges, oyster		Tongs		By hand	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Crabs, soft					99,340	$25,258
Oysters:						
Market, public, spring	258,315	$15,396	9,357	$658		
Market, private, spring	22,928	1,760	1,141,925	90,856		
Market, private, fall	96,116	6,758	1,449,420	112,899		
Terrapin, diamond-back					8,996	1,619
Total	377,359	23,914	2,600,702	204,413	108,336	26,877

TEXAS

Fisheries of Texas, 1932

OPERATING UNITS: BY GEAR

Item	Haul seines	Gill nets		Trammel nets	Lines			
		Run-around	Stake		Hand	Troll	Trot with baits or snoods	Trot with hooks
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels					101			
On boats and shore:								
Regular	90	54	225	118	148	6	8	34
Casual	72				218		7	
Total	162	54	225	118	467	6	15	34
Vessels, motor					15			
Net tonnage					253			
Boats:								
Motor	7	14	32	40	55	4	1	5
Other	8	30	63	38	163		13	26
Apparatus:								
Number	54	47	267	61	467	8	25	48
Length, yards	9,315							
Square yards		13,165	74,845	22,071				
Hooks, baits or snoods					594	8	3,175	6,915

Item	Otter trawls	Spears	Dredges, oyster	Tongs	By hand	Total, exclusive of duplication
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels	40		18			143
On boats and shore:						
Regular	462	47	90	208	60	1,223
Casual		105		14	42	383
Total	502	152	108	222	102	1,749
Vessels, motor	20		6			33
Net tonnage	157		51			388
Boats:						
Motor	231		33	41		382
Other				153	64	418
Apparatus:						
Number	251	152	39	222		
Yards at mouth	3,634		38			

CATCH: BY GEAR

Species	Haul seines		Gill nets				Trammel nets	
			Runaround		Stake			
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Bluefish			1,760	$80				
Catfish and bullheads	21,450	$780	4,015	146	9,735	$354	5,610	$204
Croaker	8,800	214	5,390	98	1,540	28	8,215	177
Drum:								
Black	41,140	790	100,782	1,832	699,794	12,625	49,565	1,134
Red or redfish	73,560	4,046	44,568	2,431	366,503	19,991	127,985	7,029
Flounders	4,460	291	770	49			1,430	95
King whiting or "kingfish"	5,170	94	1,715	31			1,650	30
Mullet	4,950	90						
Pompano	3,740	340	352	32			1,067	97
Sheepshead	5,390	117	1,865	34	5,042	92	5,775	126
Snook or sergeantfish	6,875	187	1,210	33	12,258	334	110	3
Spanish mackerel	2,640	168	2,860	182			880	55
Squeteagues or "sea trout", spotted	118,926	8,038	83,336	5,303	318,136	20,244	188,545	12,467
Striped bass							495	18
Total	297,101	15,155	248,623	10,251	1,413,008	53,668	391,327	21,435

Fisheries of Texas, 1932—Continued

CATCH: BY GEAR—Continued

Species	Lines								Otter trawls	
	Hand		Troll		Trot with baits or snoods		Trot with hooks			
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Catfish and bullheads	19,965	$712					16,050	$556		
Croaker	3,080	59								
Drum:										
Black	29,260	562					11,550	210		
Red or redfish	166,883	9,303					45,320	2,522		
Groupers	18,301	380								
Jewfish	5,750	165								
Kingfish or "king mackerel"			5,280	$162						
Sheepshead	10,972	228					110	2		
Snapper, red	985,291	50,076								
Snook or sergeantfish	440	12								
Spanish mackerel	30,250	1,924	4,510	287						
Squeteagues or "sea trout", spotted	257,281	16,961					10,120	647		
Crabs, hard					44,660	$669				
Shrimp									9,244,246	$229,529
Total	1,527,473	80,382	9,790	449	44,660	669	83,150	3,937	9,244,246	229,529

Species	Spears		Dredges, oyster		Tongs		By hand	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Flounders	63,855	$4,179						
Oysters:								
Market, public, spring			230,484	$13,204	180,788	$10,419	31,660	$1,968
Market, public, fall			295,650	14,030	199,417	10,383	42,602	2,606
Total	63,855	4,179	526,134	27,234	380,205	20,802	74,262	4,574

FISHERIES OF THE PACIFIC COAST STATES[9]

The commercial yield of fishery products in the Pacific Coast States (Washington, Oregon, and California) during 1932 amounted to 560,828,471 pounds, valued at $9,484,314 to the fishermen. This is a decrease of 6 percent in quantity and 30 percent in the value of the catch as compared with the quantity and value in 1931. Of the total catch in 1932, 542,858,774 pounds, valued at $8,416,313, were fish; 17,032,597 pounds, valued at $1,051,736, were shellfish; and 937,100 pounds, valued at $16,265, were whale products. These fisheries gave employment to 17,882 fishermen, or 7 percent less than in 1931. Of the total number of fishermen employed in 1932, 6,132 were employed on vessels and 11,750 in the boat and shore fisheries.

[9] Data on the operating units and catch of the fisheries of the Pacific Coast States have been taken largely from statistics collected by the various State agencies. Supplementary surveys, compilations, and analyses have been made by agents of this Bureau in order that the figures may be presented in a manner comparable with those of other sections. While statistics of the fisheries of California are for the calendar year, those for Oregon and Washington are for the fiscal year ending Mar. 31, except that statistics of the halibut fishery in these latter States are for the calendar year.

Fisheries of the Pacific Coast States, 1932

SUMMARY OF CATCH

Product	Washington		Oregon	
	Pounds	*Value*	*Pounds*	*Value*
Fish	90,180,518	$2,922,754	21,874,361	$675,933
Shellfish, etc.	4,779,108	455,211	1,111,299	52,785
Total	94,959,626	3,377,965	22,985,660	728,718

Product	California		Total	
	Pounds	*Value*	*Pounds*	*Value*
Fish	430,803,895	$4,817,626	542,858,774	$8,416,313
Shellfish, etc.	11,142,190	543,740	17,032,597	1,051,736
Whale products	937,100	16,265	937,100	16,265
Total	442,883,185	5,377,631	560,828,471	9,484,314

OPERATING UNITS: BY STATES

Item	Washington				Oregon		
	Puget Sound district	Coastal district	Columbia River district	Total	Columbia River district	Coastal district	Total
	Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Fishermen:							
On vessels	2,776	48	9	2,833	55	29	84
On boats and shore	1,478	3,477	1,014	5,969	1,728	1,131	2,859
Total	4,254	3,525	1,023	8,802	1,783	1,160	2,943
Vessels:							
Steam	2	-----	-----	2	-----	-----	-----
Net tonnage	65	-----	-----	65	-----	-----	-----
Motor	479	24	4	507	27	9	36
Net tonnage	9,909	212	38	10,159	239	90	329
Sail	2	-----	-----	2	-----	-----	-----
Net tonnage	983	-----	-----	983	-----	-----	-----
Total vessels	483	24	4	511	27	9	36
Total net tonnage	10,957	212	38	11,207	239	90	329
Boats:							
Motor	750	400	585	1,735	1,018	818	1,836
Other	373	143	111	627	48	95	143
Apparatus:							
Purse seines:							
Salmon	203	-----	-----	203	-----	-----	-----
Length, yards	124,845	-----	-----	124,845	-----	-----	-----
Haul seines	56	-----	27	83	22	1	23
Length, yards	5,320	-----	8,466	13,786	16,795	166	16,961
Gill nets:							
Drift:							
Salmon	287	64	454	805	772	339	1,111
Square yards	336,679	114,089	1,162,240	1,613,008	2,422,536	421,716	2,844,252
Set:							
Salmon	2	173	146	321	114	439	553
Square yards	716	52,576	35,770	89,062	29,868	73,752	103,620
Lines:							
Trawl, set and hand	26,950	-----	133	27,083	297	840	1,137
Hooks	558,703	-----	5,225	563,928	9,525	17,500	27,025
Troll	1,760	680	58	2,498	816	510	1,326
Hooks	7,920	3,060	261	11,241	3,672	2,295	5,967
Pound nets	49	69	173	291	34	-----	34
Brush weirs	5	-----	-----	5	-----	-----	-----
Fish wheels	-----	-----	29	29	-----	-----	-----
Dip nets	5	45	95	145	166	-----	166
Drag bag nets	32	6	-----	38	-----	-----	-----
Length, yards	2,794	400	-----	3,194	-----	-----	-----
Reef nets	4	-----	-----	4	-----	-----	-----
Beam trawls	33	-----	-----	33	-----	-----	-----
Yards at mouth	224	-----	-----	224	-----	-----	-----
Otter trawls	-----	-----	-----	-----	-----	2	2
Yards at mouth	-----	-----	-----	-----	-----	40	40
Traps:							
Crab	2,730	2,964	-----	5,694	-----	7,560	7,560
Crawfish	-----	-----	-----	-----	396	-----	396
Tongs, rakes, and shovels	435	3,042	-----	3,477	-----	227	227
Spears	-----	10	-----	10	-----	-----	-----
Dredges, oyster	-----	4	-----	4	-----	-----	-----
Yards at mouth	-----	4	-----	4	-----	-----	-----

Fisheries of the Pacific Coast States, 1932—Continued

OPERATING UNITS: BY STATES—Continued

Item	California						Grand total
	Northern district	San Francisco district	Monterey district	San Pedro district	San Diego district	Total	
	Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Fishermen:							
On vessels	18	306	526	1,623	742	3,215	6,132
On boats and shore	418	1,035	627	641	201	2,922	11,750
Total	436	1,341	1,153	2,264	943	6,137	17,882
Vessels:							
Steam		2				2	4
Net tonnage		41				41	106
Motor	8	32	53	199	93	385	928
Net tonnage	60	384	1,197	6,930	5,160	13,731	24,219
Sail		3				3	5
Net tonnage		1,124				1,124	2,107
Total vessels	8	37	53	199	93	390	937
Total net tonnage	60	1,549	1,197	6,930	5,160	14,896	24,432
Boats:							
Motor	195	573	219	351	119	1,457	5,028
Other	111	67	24	25	4	231	1,001
Apparatus:							
Purse seines:							
Barracuda				24		24	24
Length, yards				10,581		10,581	10,581
Salmon							203
Length, yards							124,845
Sardine			22	56		78	78
Length, yards			7,960	21,726		29,686	29,686
Tuna				59		59	59
Length, yards				32,718		32,718	32,718
Lampara nets:							
Mackerel				33		33	33
Length, yards				13,651		13,651	13,651
Sardine		20	38	21	10	89	89
Length, yards		5,678	12,150	9,652	2,380	29,860	29,860
Squid			55			55	55
Length, yards			11,080			11,080	11,080
Other				7		7	7
Length, yards				2,220		2,220	2,220
Haul seines	25	3		1		29	135
Length, yards	1,971	660		214		2,845	33,592
Gill nets:							
Drift:							
Barracuda				37	18	55	55
Square yards				361,280	182,010	543,290	543,290
Salmon	105	192				297	2,218
Square yards	96,600	571,392				667,992	5,125,252
Sea bass		8	18			26	26
Square yards		15,091	48,600			63,691	63,691
Shad		186				186	186
Square yards		507,854				507,854	507,854
Set:							
"California halibut"			24			24	24
Square yards			55,920			55,920	55,920
Salmon							874
Square yards							192,682
Sea bass				41	14	55	55
Square yards				180,072	79,981	260,053	260,053
Miscellaneous	6	88	105	25	14	238	238
Square yards	5,472	133,545	242,207	25,995	13,290	420,509	420,509
Trammel nets				37	13	50	50
Square yards				281,163	227,624	508,787	508,787
Lines:							
Trawl, set and hand	197	864	1,043	1,730	1,298	5,132	33,352
Hooks	34,916	59,456	147,269	282,729	87,265	611,635	1,202,588
Troll	829	573	1,575	410	170	3,557	7,381
Hooks	3,881	3,289	3,433	430	170	11,203	28,411
Pound nets							325
Brush weirs							5
Fish wheels							29
Fyke nets		2,268				2,268	2,268
Dip nets	43	10				53	364

Fisheries of the Pacific Coast States, 1932—Continued

OPERATING UNITS: BY STATES—Continued

Item	California: Northern district	California: San Francisco district	California: Monterey district	California: San Pedro district	California: San Diego district	California: Total	Grand total
	Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Bag nets, shrimp		13				13	13
Length, yards		8,768				8,768	8,768
Drag bag nets							38
Length, yards							3,194
Reef nets							4
Paranzella nets		9	2	10		21	21
Yards at mouth		150	33	167		350	350
Beam trawls		27				27	60
Yards at mouth		180				180	404
Otter trawls							2
Yards at mouth							40
Traps:							
Crab	414	4,460				4,874	18,128
Crawfish							396
Lobster				4,291	1,938	6,229	6,229
Octopus	5		119			124	124
Harpoons:							
Swordfish and turtles				40	24	64	64
Whales		2				2	2
Tongs, rakes, and shovels	8	99	41	58		206	3,910
Abalone outfits		1	14	3		18	18
Spears							10
Dredges, oyster							4
Yards at mouth							4

CATCH: BY STATES

Species	Washington: Pounds	Washington: Value	Oregon: Pounds	Oregon: Value
FISH				
Carp	53,912	$1,078	10,000	$200
Cod [1]	7,327,590	73,950		
Flounders:				
"Sole"	217,567	5,086	54,542	1,320
Other	64,349	1,154	52,240	681
Halibut	23,817,570	1,068,099	307,983	13,704
Herring	766,726	11,501	16,968	148
"Lingcod"	522,662	15,411	105,663	2,011
Perch	38,195	1,069	8,344	121
Rockfishes	297,190	8,810	33,303	559
Sablefish	1,670,744	41,478	78,633	1,600
Salmon	52,238,357	1,622,289	19,150,594	609,232
Shad	100,627	2,013	615,308	9,329
Smelt	1,698,132	37,440	236,540	5,001
Steelhead trout	1,317,315	31,353	1,142,167	29,900
Striped bass			18,139	976
Sturgeon	32,370	836	43,937	1,151
Other fish	17,212	1,187		
Total	90,180,518	2,922,754	21,874,361	675,933
SHELLFISH, ETC.				
Crabs	1,403,092	59,522	982,749	37,970
Crawfish			80,000	6,000
Shrimp	46,236	3,269		
Clams:				
Hard	406,431	19,921		
Razor	526,331	108,190	31,282	6,343
Mixed			14,759	1,506
Octopus	37,351	1,076	33	2
Oysters:				
Eastern, market	2,400	1,370		
Japanese, market	2,093,945	126,999		
Native, market	256,731	133,005	2,476	964
Scallops	6,591	1,859		
Total	4,779,108	455,211	1,111,299	52,785
Grand total	94,959,626	3,377,965	22,985,660	728,718

[1] The cod were taken off Alaska.

Fisheries of the Pacific Coast States, 1932—Continued

CATCH: BY STATES—Continued

Species	California [1]		Total	
	Pounds	*Value*	*Pounds*	*Value*
FISH				
Anchovies	299,217	$3,374	299,217	$3,374
Barracuda	2,926,775	156,398	2,926,775	156,398
Cabrilla	340,008	11,898	340,008	11,898
Carp	29,500	438	93,412	1,716
Catfish	254,027	27,570	254,027	27,570
Cod [2]	4,418,539	53,590	11,746,129	127,540
Corbina	2,469	99	2,469	99
Eels	242	9	242	9
Flounders:				
"California halibut"	933,927	73,206	933,927	73,206
"Sole"	8,888,942	310,691	9,161,051	317,097
Other	1,234,465	42,604	1,351,054	44,439
Flyingfish	40,535	1,366	40,535	1,366
Grayfish	850,888	13,252	850,888	13,252
Groupers	18,689	646	18,689	646
Hake	28,751	407	28,751	407
Halibut	661,603	29,788	24,787,156	1,111,591
Hardhead	110,557	8,040	110,557	8,040
Herring	765,724	4,985	1,549,418	16,634
Horse mackerel	536,409	14,497	536,409	14,497
Kingfish	447,531	10,903	447,531	10,903
"Lingcod"	899,912	24,959	1,528,237	42,381
Mackerel	12,473,746	94,661	12,473,746	94,661
Marlin	24,676	981	24,676	981
Mullet	22,690	1,076	22,690	1,076
Perch	206,477	9,169	253,016	10,359
Pilchard or sardine	312,171,716	825,349	312,171,716	825,349
Pompano	9,633	2,580	9,633	2,580
Rockbass	436,564	21,483	436,564	21,483
Rockfishes	5,636,309	171,274	5,966,802	180,643
Rudderfish	36,826	1,936	36,826	1,936
Sablefish	975,373	20,203	2,724,750	63,281
Salmon	4,699,120	161,740	76,088,071	2,393,261
Sculpin	90,181	5,873	90,181	5,873
Sea bass:				
Black	473,394	16,560	473,394	16,560
White	806,504	60,818	806,504	60,818
Shad	1,173,471	29,342	1,889,406	40,684
Sheepshead	89,591	2,328	89,591	2,328
Skates	292,412	4,622	292,412	4,622
Smelt	894,096	33,472	2,828,768	75,913
Spanish mackerel	10,822	567	10,822	567
Splittail	24,420	650	24,420	650
Squawfish	2,004	99	2,004	99
Steelhead trout			2,459,482	61,253
Striped bass	537,376	45,883	555,515	46,859
Sturgeon			76,307	1,987
Suckers	6,525	52	6,525	52
Swordfish	662,705	58,465	662,705	58,465
Tomcod	4,271	171	4,271	171
Tuna and tunalike fishes:				
Albacore	619,694	31,062	619,694	31,062
Bluefin	1,071,206	50,637	1,071,206	50,637
Bonito	2,862,286	53,465	2,862,286	53,465
Skipjack or striped tuna	21,636,577	751,499	21,636,577	751,499
Yellowfin	36,923,410	1,504,812	36,923,410	1,504,812
Whitebait	133,746	6,406	133,746	6,406
Whitefish	162,027	8,053	162,027	8,053
Yellowtail	1,796,364	51,161	1,796,364	51,161
Other fish	148,973	2,457	166,185	3,644
Total	430,803,895	4,817,626	542,858,774	8,416,313
SHELLFISH, ETC.				
Crabs	2,434,132	201,733	4,819,973	299,225
Crawfish			80,000	6,000
Sea crawfish or spiny lobster	1,018,647	142,398	1,018,647	142,398
Shrimp	2,682,789	40,512	2,729,025	43,781
Abalone	563,469	77,386	563,469	77,386
Clams:				
Cockle	36,722	8,636	36,722	8,636
Hard			406,431	19,921
Pismo	27,576	7,297	27,576	7,297
Razor	1,307	380	558,920	114,913
Soft	61,410	13,978	61,410	13,978
Mixed	158	45	14,917	1,551
Mussels, sea	23	13	23	13
Octopus	21,187	1,472	58,571	2,550

[1] Taken off the Pacific coast including Latin America.
[2] The cod were taken off Alaska.

Fisheries of the Pacific Coast States, 1932—Continued

CATCH: BY STATES—Continued

Species	California		Total	
	Pounds	*Value*	*Pounds*	*Value*
SHELLFISH, ETC.—continued				
Oysters:				
Eastern, market	39,227	$12,258	41,627	$13,628
Japanese, market	9,142	2,286	2,103,087	129,285
Native, market	10,930	4,544	270,137	138,513
Scallops			6,591	1,859
Squid	4,229,743	30,514	4,229,743	30,514
Turtles	5,728	288	5,728	288
Total	11,142,190	543,740	17,032,597	1,051,736
WHALE PRODUCTS				
Whale meat	434,000	9,765	434,000	9,765
Whale oil	503,100	6,500	503,100	6,500
Total	937,100	16,265	937,100	16,265
Grand total	442,883,185	5,377,631	560,828,471	9,484,314

WASHINGTON

Fisheries of Washington, 1932

CATCH: BY DISTRICTS

Species	Puget Sound district		Coastal district		Columbia River district	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
FISH						
Carp					53,912	$1,078
Cod [1]	7,327,590	$73,950				
Flounders:						
"Sole"	217,567	5,086				
Other	64,349	1,154				
Halibut	23,746,928	1,064,591	1,752	$53	68,890	3,455
Herring	766,726	11,501				
"Lingcod"	477,996	14,696	17,854	179	26,812	536
Perch	38,195	1,069				
Rockfishes	282,484	8,593	5,978	60	8,728	157
Sablefish	1,661,972	41,281			8,772	197
Salmon:						
Blueback, red or sockeye	5,867,099	343,224	852,120	42,606	93,761	5,626
Chinook or king	7,925,196	403,719	2,612,937	89,616	7,197,214	291,001
Chum or keta	11,302,705	114,438	3,208,332	8,021	686,269	1,716
Humpback or pink	68,600	686				
Silver or coho	8,539,150	227,465	3,196,520	75,312	688,454	18,859
Shad					100,627	2,013
Smelt	130,264	4,664	106,090	3,183	1,461,778	29,593
Steelhead trout	68,325	4,092	114,015	4,561	1,134,975	22,700
Sturgeon	504	35	900	27	30,966	774
Other fish	17,212	1,187				
Total	68,502,862	2,321,431	10,116,498	223,618	11,561,158	377,705
SHELLFISH						
Crabs	387,552	15,854	1,015,540	43,668		
Shrimp	46,236	3,269				
Clams:						
Hard:						
Butter	112,027	5,489				
Little neck	293,899	14,401				
Other			505	31		
Razor			526,331	108,190		
Octopus	37,351	1,076				
Oysters:						
Eastern, market			2,400	1,370		
Japanese, market	567,444	35,465	1,526,501	91,534		
Native, market	223,341	120,628	33,390	12,377		
Scallops	6,591	1,859				
Total	1,674,441	198,041	3,104,667	257,170		
Grand total	70,177,303	2,519,472	13,221,165	480,788	11,561,158	377,705

[1] The cod were taken off Alaska.

Fisheries of the Puget Sound district of Washington, 1932

OPERATING UNITS: BY GEAR

Item	Purse seines, salmon	Haul seines	Gill nets		Lines		Pound nets	Brush weirs
			Drift, salmon	Set, salmon	Trawl, set, and hand	Troll		
	Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Fishermen:								
On vessels	1,494	15			1,079	216	14	
On boats and shore		149	295	2	64	310	119	10
Total	1,494	164	295	2	1,143	526	133	10
Vessels:								
Steam							1	
Net tonnage							42	
Motor	203	4			145	122	3	
Net tonnage	4,856	31			4,046	997	101	
Sail					2			
Net tonnage					983			
Total vessels	203	4			147	122	4	
Total net tonnage	4,856	31			5,029	997	143	
Boats:								
Motor		30	276	2	66	230		
Other		24	11		167			5
Apparatus:								
Number	203	56	287	2	26,950	1,760	49	5
Length, yards	124,845	5,320						
Square yards			336,679	716				
Hooks					558,703	7,920		

Item	Dip nets	Drag bag nets	Reef nets	Beam trawls	Traps, crab	Tongs and rakes	Shovels	Total, exclusive of duplication
	Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Fishermen:								
On vessels				65		4		2,776
On boats and shore	5	93	16	21	130	107	314	1,478
Total	5	93	16	86	130	111	314	4,254
Vessels:								
Steam				1				2
Net tonnage				23				65
Motor				23				479
Net tonnage				309				9,909
Sail								2
Net tonnage								983
Total vessels				24				483
Total net tonnage				332				10,957
Boats:								
Motor		27	4	9	124	24		750
Other	5	9	8		6	142		373
Apparatus:								
Number	5	32	4	33	2,730	121	314	
Length, yards		2,794						
Yards at mouth				224				

Fisheries of the Puget Sound district of Washington, 1932—Continued

CATCH: BY GEAR

Species	Purse seines		Haul seines		Gill nets			
					Drift		Set	
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Flounders:								
"Sole"			1,210	$28				
Other			685	12				
Herring	732	$11	40,376	606				
"Lingcod"	104	3	337	10			1,355	$41
Perch			28,937	810				
Rockfishes			6,130	210			823	28
Salmon:								
Blueback, red or sockeye	2,613,996	152,919			17,143	$1,003		
Chinook or king	606,474	12,918			526,988	30,302		
Chum or keta	10,357,105	103,571			440,630	5,067		
Humpback or pink	50,000	500			15			
Silver or coho	5,174,840	121,609	13,067	394	235,312	8,471	3,410	122
Smelt	1,567	56	82,531	2,955				
Steelhead trout	10,404	624			12,021	714		
Other fish			400	8				
Total	18,815,222	392,211	173,673	5,033	1,232,109	45,557	5,588	191

Species	Lines				Pound nets		Brush weirs	
	Trawl, set, and hand		Troll					
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Cod	7,327,590	$73,950						
Flounders:								
"Sole"					500	$7		
Other					1,328	20		
Halibut	23,690,776	1,062,345	55,475	$2,219	648	26		
Herring							723,190	$10,848
"Lingcod"	440,354	13,557	19,223	577	1,855	56		
Perch					15			
Rockfishes	242,875	7,236	450	14				
Sablefish	1,661,972	41,281						
Salmon:								
Blueback, red or sockeye			119	6	3,227,973	188,836		
Chinook or king			3,733,888	184,673	3,057,318	175,796		
Chum or keta					500,170	5,752		
Humpback or pink			55	1	18,440	184		
Silver or coho			2,281,145	66,940	821,816	29,585		
Steelhead trout					45,900	2,754		
Sturgeon					504	35		
Other fish	120	2			364	7		
Total	33,363,687	1,198,371	6,090,355	254,430	7,676,831	403,058	723,190	10,848
SHELLFISH								
Octopus	36,486	1,051			85	2		
Grand total	33,400,173	1,199,422	6,090,355	254,430	7,676,916	403,060	723,190	10,848

Fisheries of the Puget Sound district of Washington, 1932—Continued

CATCH: BY GEAR—Continued

Species	Dip nets		Drag bag nets		Reef nets		Beam trawls	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
FISH								
Flounders:								
"Sole"							215,857	$5,051
Other							62,336	1,122
Halibut							29	1
Herring	2,228	$33	200	$3				
"Lingcod"							14,768	452
Perch			8,841	248			402	11
Rockfishes							32,206	1,105
Salmon:								
Blueback, red or sockeye					7,868	$460		
Chinook or king					528	30		
Chum or keta					4,800	48		
Humpback or pink					90	1		
Silver or coho					9,560	344		
Smelt			46,166	1,653				
Other fish			5,171	181			11,157	989
Total	2,228	33	60,378	2,085	22,846	883	336,755	8,731
SHELLFISH								
Shrimp							46,236	3,269
Octopus			760	22			20	1
Scallops							6,591	1,859
Total			760	22			52,847	5,129
Grand total	2,228	33	61,138	2,107	22,846	883	389,602	13,860

Species	Traps		Tongs and rakes		Shovels	
SHELLFISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Crabs	387,552	$15,854				
Clams:						
Hard:						
Butter					112,027	$5,489
Little neck					293,899	14,401
Oysters:						
Japanese, market			567,444	$35,465		
Native, market			223,341	120,628		
Total	387,552	15,854	790,785	156,093	405,926	19,890

NOTE.—The catch of sea cucumbers is included with "Other fish" under beam trawls.

Fisheries of the coastal district of Washington, 1932

OPERATING UNITS: BY GEAR

Item	Gill nets		Lines, troll	Pound nets	Dip nets	Drag bag nets
	Drift, salmon	Set, salmon				
	Number	*Number*	*Number*	*Number*	*Number*	*Number*
Fishermen:						
On vessels			25			
On boats and shore	75	147	170	41	45	40
Total	75	147	195	41	45	40
Vessels:						
Motor			14			
Net tonnage			125			
Boats:						
Motor	64	94	126	30		
Other		58		22		6
Apparatus:						
Number	64	173	680	69	45	6
Length, yards						400
Square yards	114,089	52,576				
Hooks			3,060			

Fisheries of the coastal district of Washington, 1932—Continued

OPERATING UNITS: BY GEAR—Continued

Item	Traps, crab	Tongs and rakes	Shovels	Spears	Dredges	Total, exclusive of duplication
	Number	*Number*	*Number*	*Number*	*Number*	*Number*
Fishermen:						
On vessels	15				8	48
On boats and shore	81	71	2,967	10		3,477
Total	96	71	2,967	10	8	3,525
Vessels:						
Motor	8				2	24
Net tonnage	74				13	212
Boats:						
Motor	73	19				400
Other	8	51				143
Apparatus:						
Number	2,964	75	2,967	10	4	
Yards at mouth					4	

CATCH: BY GEAR

Species	Gill nets				Lines, troll	
	Drift		Set[1]			
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Halibut					1,752	$53
"Lingcod"					17,854	179
Rockfishes					5,978	60
Salmon:						
Blueback, red or sockeye			852,120	$42,606		
Chinook or king	356,109	$7,834	242,754	5,341	1,785,109	71,404
Chum or keta	296,616	742	1,176,420	2,941		
Silver or coho	254,480	5,599	864,484	19,019	1,691,626	42,798
Steelhead trout	190	8	109,695	4,388		
Sturgeon	210	6				
Total	907,605	14,189	3,245,473	74,295	3,502,319	114,494

Species	Pound nets		Dip nets		Drag bag nets	
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Salmon:						
Chinook or king	228,965	$5,037				
Chum or keta	1,735,296	4,338				
Silver or coho	385,930	7,896				
Smelt			26,090	$783	80,000	$2,400
Steelhead trout	4,130	165				
Sturgeon	690	21				
Total	2,355,011	17,457	26,090	783	80,000	2,400

Species	Traps		Dredges, tongs, and rakes		Shovels	
SHELLFISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Crabs	1,015,540	$43,668				
Clams:						
Hard					505	$31
Razor					526,331	108,190
Oysters:						
Eastern, market			2,400	$1,370		
Japanese, market			1,526,501	91,534		
Native, market			33,390	12,377		
Total	1,015,540	43,668	1,562,291	105,281	526,836	108,221

[1] Includes catch by spears.

Fisheries of the Columbia River district of Washington, 1932

OPERATING UNITS: BY GEAR

Item	Haul seines	Gill nets: Drift, salmon	Gill nets: Set, salmon	Lines: Trawl and set	Lines: Troll	Pound nets	Fish wheels	Dip nets	Total, exclusive of duplication
	Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Fishermen:									
On vessels				4	5				9
On boats and shore	238	571	57	10	13	104	18	95	1,014
Total	238	571	57	14	18	104	18	95	1,023
Vessels:									
Motor				1	3				4
Net tonnage				15	23				38
Boats:									
Motor	17	454	36	8	10	76		50	585
Other	25		21	2		54		15	111
Apparatus:									
Number	27	454	146	133	58	173	29	96	
Length, yards	8,466								
Square yards		1,162,240	35,770						
Hooks				5,225	261				

CATCH: BY GEAR

Species	Haul seines: Pounds	Haul seines: Value	Gill nets, Drift: Pounds	Gill nets, Drift: Value	Gill nets, Set: Pounds	Gill nets, Set: Value	Lines, trawl and set: Pounds	Lines, trawl and set: Value
Carp	53,912	$1,078						
Halibut							68,890	$3,455
"Lingcod"							26,812	536
Rockfishes							8,728	157
Sablefish							8,772	197
Salmon:								
Blueback, red or sockeye	7,283	437	12,010	$721	1,008	$61		
Chinook or king	1,137,295	45,492	3,331,798	135,271	23,595	958		
Chum or keta	1,120	3	368,686	922				
Silver or coho	24,149	645	141,161	3,769	1,563	42		
Shad	23,126	463	59,845	1,197	477	10		
Smelt			357,243	7,502				
Steelhead trout	147,831	2,957	368,450	7,369	7,487	150		
Sturgeon	358	9	11,619	290	2,901	72	4,716	118
Total	1,395,065	51,084	4,650,812	157,041	37,031	1,293	117,918	4,463

Species	Lines, troll: Pounds	Lines, troll: Value	Pound nets: Pounds	Pound nets: Value	Fish wheels: Pounds	Fish wheels: Value	Dip nets: Pounds	Dip nets: Value
Salmon:								
Blueback, red or sockeye			49,122	$2,947	23,151	$1,389	1,787	$71
Chinook or king	21,274	$851	2,143,838	87,040	449,631	17,798	89,783	3,591
Chum or keta			316,463	791				
Silver or coho	176,984	5,203	340,685	9,096	54	1	3,867	103
Shad			7,770	155	9,409	188		
Smelt							1,104,535	22,091
Steelhead trout			559,850	11,197	39,510	790	11,841	237
Sturgeon			4,105	103	7,267	182		
Total	198,258	6,054	3,421,839	111,329	529,022	20,848	1,211,213	26,093

OREGON

Fisheries of Oregon, 1932

CATCH: BY DISTRICTS

Species	Columbia River district		Coastal district	
	Pounds	*Value*	*Pounds*	*Value*
FISH				
Carp	10,000	$200	----------	----------
Flounders:				
"Sole"	2,913	73	51,629	$1,247
Other	1,002	20	51,238	661
Halibut	157,400	7,759	150,583	5,945
Herring	----------	----------	16,968	148
"Lingcod"	20,478	410	85,185	1,601
Perch	----------	----------	8,344	121
Rockfishes	12,911	226	20,392	333
Sablefish	27,749	624	50,884	976
Salmon:				
Blueback, red, or sockeye	91,015	5,461	----------	----------
Chinook or king	8,845,006	358,472	1,814,138	45,766
Chum or keta	550,862	1,378	97,893	245
Silver or coho	2,876,838	83,647	4,874,842	114,263
Shad	218,289	4,366	397,019	4,963
Smelt	233,143	4,896	3,397	105
Steelhead trout	965,708	19,313	176,459	10,587
Striped bass	----------	----------	18,139	976
Sturgeon	40,466	1,042	3,471	109
Total	14,053,780	487,887	7,820,581	188,046
SHELLFISH				
Crabs	----------	----------	982,749	37,970
Crawfish	80,000	6,000	----------	----------
Clams:				
Razor	----------	----------	31,282	6,343
Mixed	----------	----------	14,759	1,506
Octopus	----------	----------	33	2
Oysters, native, market	----------	----------	2,476	964
Total	80,000	6,000	1,031,299	46,785
Grand total	14,133,780	493,887	8,851,880	234,831

Fisheries of the Columbia River district of Oregon, 1932

OPERATING UNITS: BY GEAR

Item	Haul seines	Gill nets		Lines		Pound nets	Dip nets	Traps, craw-fish	Total, exclusive of duplication
		Drift, salmon	Set, salmon	Trawl and set	Troll				
	Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Fishermen:									
On vessels	------	------	------	8	47	------	------	------	55
On boats and shore	286	992	51	39	181	29	166	22	1,728
Total	286	992	51	47	228	29	166	22	1,783
Vessels:									
Motor	------	------	------	2	25	------	------	------	27
Net tonnage	------	------	------	27	212	------	------	------	239
Boats:									
Motor	14	772	45	30	145	18	------	18	,018
Other	21	------	6	9	------	10	------	4	48
Apparatus:									
Number	22	772	114	297	816	34	166	396	------
Length, yards	16,795	------	------	------	------	------	------	------	------
Square yards	------	2,422,536	29,868	------	------	------	------	------	------
Hooks	------	------	------	9,525	3,672	------	------	------	------

Fisheries of the Columbia River district of Oregon, 1932—Continued

CATCH: BY GEAR

Species	Haul seines		Gill nets		Lines: Trawl and set		Lines: Troll	
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Carp	10,000	$200						
Flounders:								
"Sole"					2,913	$73		
Other					1,002	20		
Halibut					157,400	7,759		
"Lingcod"					20,478	410		
Rockfishes					12,911	226		
Sablefish					27,749	624		
Salmon:								
Blueback, red, or sockeye	16,843	1,011	39,786	$2,387				
Chinook or king	1,019,283	40,771	7,275,704	295,394			188,401	$7,689
Chum or keta	29,441	74	490,646	1,227				
Silver or coho	3,861	103	212,538	5,675			2,578,244	75,675
Shad	59,542	1,191	158,438	3,169				
Smelt			233,143	4,896				
Steelhead trout	359,811	7,196	451,570	9,031				
Sturgeon	365	10	29,852	756	7,147	191		
Total	1,499,146	50,556	8,891,677	322,535	229,600	9,303	2,766,645	83,364

Species	Pound nets		Dip nets		Traps	
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Salmon:						
Blueback, red, or sockeye	32,980	$1,979	1,406	$84		
Chinook or king	252,253	10,243	109,365	4,375		
Chum or keta	30,775	77				
Silver or coho	77,909	2,080	4,286	114		
Shad	309	6				
Steelhead trout	144,868	2,897	9,459	189		
Sturgeon	744	14	2,358	71		
Total	539,838	17,296	126,874	4,833		
SHELLFISH						
Crawfish					80,000	$6,000
Grand total	539,838	17,296	126,874	4,833	80,000	6,000

Fisheries of the coastal district of Oregon, 1932

OPERATING UNITS: BY GEAR

Item	Haul seines	Gill nets: Drift, salmon	Gill nets: Set, salmon	Lines: Trawl and set	Lines: Troll	Otter trawls	Traps, crab	Tongs	Shovels	Total, exclusive of duplication
	No.	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*
Fishermen:										
On vessels				19	6	8				29
On boats and shore	2	428	175	6	158		240	1	226	1,181
Total	2	428	175	25	164	8	240	1	226	1,160
Vessels:										
Motor				5	3	2				9
Net tonnage				60	22	29				90
Boats:										
Motor	1	406	112	2	119		219	1		818
Other	1	22	59				21	1		95
Apparatus:										
Number	1	339	439	840	510	2	7,560	1	226	
Length, yards	166									
Square yards		421,716	73,752							
Yards at mouth						40				
Hooks				17,500	2,295					

Fisheries of the coastal district of Oregon, 1932—Continued

CATCH: BY GEAR

Species	Haul seines		Gill nets		Lines: Trawl and set		Lines: Troll	
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Flounders:								
"Sole"			996	$17	6,908	$114		
Other	2,934	$57	24,583	272	2,304	25		
Halibut					146,062	5,744	2,401	$119
Herring	12,850	106	4,118	42				
"Lingcod"					52,911	946	25,307	509
Perch	5,473	76	2,612	42				
Rockfishes					16,486	272		
Sablefish					50,884	976		
Salmon:								
Chinook or king			1,737,737	43,443			76,401	2,323
Chum or keta			97,893	245				
Silver or coho			3,151,404	55,150			1,722,728	59,090
Shad			397,019	4,963				
Smelt	492	20	2,905	85				
Steelhead trout			176,425	10,585			34	2
Striped bass			17,997	974				
Sturgeon			3,352	101				
Total	21,749	259	5,617,041	115,919	275,555	8,077	1,826,871	62,041
SHELLFISH								
Octopus					33	2		
Grand total	21,749	259	5,617,041	115,919	275,588	8,079	1,826,871	62,041

Species	Otter trawls		Traps		Tongs		Shovels	
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Flounders:								
"Sole"	43,725	$1,116						
Other	21,417	307						
Halibut	2,120	82						
"Lingcod"	6,967	148						
Perch	259	3						
Rockfishes	3,906	61						
Salmon, silver or coho	710	23						
Striped bass	142	2						
Sturgeon	119	8						
Total	79,365	1,750						
SHELLFISH								
Crabs			982,749	$37,970				
Clams:								
Razor							31,282	$6,343
Mixed							14,759	1,506
Oysters, native, market					2,476	$964		
Total			982,749	37,970	2,476	964	46,041	7,849
Grand total	79,365	1,750	982,749	37,970	2,476	964	46,041	7,849

CALIFORNIA

Fisheries of California, 1932

CATCH: BY DISTRICTS

Species	Northern district		San Francisco district		Monterey district	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
FISH						
Anchovies			147,627	$1,476	120,043	$1,269
Barracuda					2,968	193
Carp			29,500	438		
Catfish			254,027	27,570		
Cod			4,418,539	53,590		
Eels			208	8		
Flounders:						
"California halibut"			389	27	50,407	3,591
"Sole"	5,082,583	$177,890	3,095,571	108,345	410,795	15,205
Other	404,667	14,870	728,071	23,131	92,920	2,925
Grayfish	5,140	51	216,234	2,163	8,263	74
Hake	10,143	152	13,291	200	4,893	49
Halibut	645,828	28,603	15,775	1,185		
Hardhead			110,557	8,040		
Herring	8,699	191	726,925	4,399	18,136	185
Horse mackerel					119,268	5,339
Kingfish	945	38	4,914	172	140,455	4,963
"Lingcod"	465,434	9,414	302,227	10,578	130,268	4,900
Mackerel			3,056	122	665,919	13,318
Perch	18,613	567	74,866	2,937	59,485	2,253
Pilchard or sardine	140	2	29,357,768	73,824	168,284,301	422,204
Pompano					240	47
Rockfishes	389,895	7,771	663,194	21,618	2,071,152	55,375
Sablefish	618,532	11,280	45,223	1,244	229,806	4,702
Salmon	3,128,939	103,572	1,489,281	52,474	80,884	5,692
Sculpin	46	1	3,561	178	912	11
Sea bass:						
Black					81	3
White			9,212	896	25,632	1,965
Shad			1,173,355	29,338	29	1
Skates	27,108	407	205,272	3,079	29,176	544
Smelt	65,553	2,221	288,468	13,164	188,461	7,106
Splittail			24,420	650		
Squawfish			2,004	99		
Striped bass			537,376	45,883		
Suckers			6,525	52		
Tomcod	2,619	105	1,652	66		
Tuna and tunalike fishes:						
Albacore	21	3			606,313	30,211
Bluefin					38	3
Bonito					31	2
Whitebait	91,325	3,396	28,317	2,237	14,104	773
Other fish	119,696	1,784	17,880	272	4,453	133
Total	11,085,926	362,318	43,995,285	489,455	173,359,433	583,036
SHELLFISH						
Crabs	116,458	9,165	2,290,131	190,873	27,398	1,686
Shrimp			2,681,807	40,227	982	285
Abalone			25	5	427,075	63,884
Clams:						
Cockle	74	13	29,736	7,122	13	2
Pismo					6,289	1,443
Soft	7,948	1,284	53,462	12,694		
Mixed			154	44	4	1
Mussels	18	12				
Octopus	1,732	112	1,649	115	17,554	1,217
Oysters, market:						
Eastern			39,227	12,258		
Japanese					9,142	2,286
Native	647	260	10,283	4,284		
Squid					4,087,621	27,261
Total	126,877	10,846	5,106,474	267,622	4,576,078	98,065
WHALE PRODUCTS						
Whale meat			434,000	9,765		
Whale oil			503,100	6,500		
Total			937,100	16,265		
Grand total	11,212,803	373,164	50,038,859	773,342	177,935,511	681,101

Fisheries of California, 1932—Continued

CATCH: BY DISTRICTS—Continued

Species	San Pedro district					
	Off California		Off Latin America		Total	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
FISH						
Anchovies	31,547	$629			31,547	$629
Barracuda	2,033,875	97,718	372,005	$31,348	2,405,880	129,066
Cabrilla			102,989	3,458	102,989	3,458
Corbina			2,469	99	2,469	99
Eels	34	1			34	1
Flounders:						
"California halibut"	802,841	62,915	1,528	97	804,369	63,012
"Sole"	298,376	9,100			298,376	9,100
Other	8,794	1,677			8,794	1,677
Flyingfish	40,535	1,366			40,535	1,366
Grayfish	482,776	10,359			482,776	10,359
Groupers			3,774	113	3,774	113
Hake	424	6			424	6
Herring	103	5			103	5
Horse mackerel	417,141	9,158			417,141	9,158
Kingfish	298,913	5,672			298,913	5,672
"Lingcod"	1,971	66			1,971	66
Mackerel	11,626,356	78,309			11,626,356	78,309
Marlin	20,071	791			20,071	791
Mullet	3,657	205			3,657	205
Perch	52,646	3,394			52,646	3,394
Pilchard or sardine	113,984,444	325,246			113,984,444	325,246
Pompano	5,317	2,020	3,728	485	9,045	2,505
Rock bass	248,022	13,469	3,522	200	251,544	13,669
Rockfishes	1,843,284	62,783			1,843,284	62,783
Rudderfish	35,611	1,881			35,611	1,881
Sablefish	81,812	2,977			81,812	2,977
Salmon	16	2			16	2
Sculpin	72,101	4,883			72,101	4,883
Sea bass:						
Black	70,999	2,793	150,257	6,181	221,256	8,974
White	542,906	42,117	79,401	6,049	622,307	48,166
Shad	87	3			87	3
Sheepshead	79,754	2,028	41	1	79,795	2,029
Skates	30,477	587			30,477	587
Smelt	320,746	10,291			320,746	10,291
Spanish mackerel			3,209	192	3,209	192
Swordfish	446,350	37,730	8,485	787	454,835	38,517
Tuna and tunalike fishes:						
Albacore	13,360	848			13,360	848
Bluefin	437,287	25,057	608,170	24,328	1,045,457	49,385
Bonito	965,554	17,756	1,139,808	22,559	2,105,362	40,315
Skipjack or striped tuna	27,459	961	8,267,392	288,196	8,294,851	289,157
Yellowfin	4,494	299	16,072,041	657,767	16,076,535	658,066
Whitefish	61,697	3,618	2,274	132	63,971	3,750
Yellowtail	763,781	20,951	524,645	15,744	1,288,426	36,695
Other fish	6,922	267			6,922	267
Total	136,162,540	859,938	27,345,738	1,057,736	163,508,278	1,917,674
SHELLFISH						
Crabs	145	9			145	9
Sea crawfish or spiny lobster	254,659	35,914	25,066	4,086	279,725	40,000
Abalone	136,369	13,497			136,369	13,497
Clams:						
Cockle	6,899	1,499			6,899	1,499
Pismo	21,287	5,854			21,287	5,854
Razor	1,307	380			1,307	380
Mussels	5	1			5	1
Octopus	183	20			183	20
Squid	142,007	3,244			142,007	3,244
Total	562,861	60,418	25,066	4,086	587,927	64,504
Grand total	136,725,401	920,356	27,370,804	1,061,822	164,096,205	1,982,178

Fisheries of California, 1932—Continued

CATCH: BY DISTRICTS—Continued

Species	San Diego district					
	Off California		Off Latin America		Total	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
FISH						
Barracuda	468, 258	$22, 877	49, 669	$4, 262	517, 927	$27, 139
Cabrilla			237, 019	8, 440	237, 019	8, 440
Flounders:						
"California halibut"	69, 589	5, 604	9, 173	972	78, 762	6, 576
"Sole"	1, 617	151			1, 617	151
Other	13	1			13	1
Grayfish	138, 357	604	118	1	138, 475	605
Groupers			14, 915	533	14, 915	533
Herring	11, 861	205			11, 861	205
Kingfish	2, 304	58			2, 304	58
"Lingcod"	12	1			12	1
Mackerel	178, 415	2, 912			178, 415	2, 912
Marlin	4, 320	181	285	9	4, 605	190
Mullet	16, 278	746	2, 755	125	19, 033	871
Perch	867	18			867	18
Pilchard or sardine	544, 997	4, 072	66	1	545, 063	4, 073
Pompano			348	28	348	28
Rock bass	183, 746	7, 740	1, 274	74	185, 020	7, 814
Rockfishes	658, 015	23, 267	10, 769	460	668, 784	23, 727
Rudderfish	1, 215	55			1, 215	55
Sculpin	13, 561	800			13, 561	800
Sea bass:						
Black	160, 004	4, 909	92, 053	2, 674	252, 057	7, 583
White	91, 321	5, 640	58, 032	4, 151	149, 353	9, 791
Sheepshead	9, 591	293	205	6	9, 796	299
Skates	379	5			379	5
Smelt	30, 868	690			30, 868	690
Spanish mackerel			7, 613	375	7, 613	375
Swordfish	205, 668	19, 701	2, 202	247	207, 870	19, 948
Tuna and tunalike fishes:						
Bluefin	22, 719	1, 069	2, 992	180	25, 711	1, 249
Bonito	745, 837	12, 934	11, 056	214	756, 893	13, 148
Skipjack or striped tuna	347, 583	9, 388	12, 994, 143	452, 954	13, 341, 726	462, 342
Yellowfin	160, 829	6, 667	20, 686, 046	840, 079	20, 846, 875	846, 746
Whitefish	87, 794	3, 781	10, 262	522	98, 056	4, 303
Yellowtail	260, 305	6, 457	247, 633	8, 009	507, 938	14, 466
Other fish	22	1			22	1
Total	4, 416, 345	140, 827	34, 438, 628	1, 324, 316	38, 854, 973	1, 465, 143
SHELLFISH						
Sea crawfish or spiny lobster	64, 648	9, 147	674, 274	93, 251	738, 922	102, 398
Octopus	69	8			69	8
Squid	115	9			115	9
Turtles			5, 728	288	5, 728	288
Total	64, 832	9, 164	680, 002	93, 539	744, 834	102, 703
Grand total	4, 481, 177	149, 991	35, 118, 630	1, 417, 855	39, 599, 807	1, 567, 846

Fisheries of California, 1932—Continued

CATCH: BY WATERS

Species	Off California[1]		Off Latin America	
	Pounds	Value	Pounds	Value
FISH				
Anchovies	299,217	$3,374		
Barracuda	2,505,101	120,788	421,674	$35,610
Cabrilla			340,008	11,898
Carp	29,500	438		
Catfish	264,027	27,570		
Cod	4,418,539	53,590		
Corbina			2,469	99
Eels	242	9		
Flounders:				
"California halibut"	923,226	72,137	10,701	1,069
"Sole"	8,888,942	310,691		
Other	1,234,465	42,604		
Flyingfish	40,535	1,366		
Grayfish	850,770	13,251	118	1
Groupers			18,689	646
Hake	28,751	407		
Halibut	661,603	29,788		
Hardhead	110,557	8,040		
Herring	765,724	4,985		
Horse mackerel	536,409	14,497		
Kingfish	447,531	10,903		
"Lingcod"	899,912	24,959		
Mackerel	12,473,746	94,661		
Marlin	24,391	972	285	9
Mullet	19,935	951	2,775	125
Perch	206,477	9,169		
Pilchard or sardine	312,171,650	825,348	66	1
Pompano	5,557	2,067	4,076	513
Rock bass	431,768	21,209	4,796	274
Rockfish	5,625,540	170,814	10,769	460
Rudderfish	36,826	1,936		
Sablefish	975,373	20,203		
Salmon	4,699,120	161,740		
Sculpin	90,181	5,873		
Sea bass:				
Black	231,084	7,705	242,310	8,855
White	669,071	50,618	137,433	10,200
Shad	1,173,471	29,342		
Sheepshead	89,345	2,321	246	7
Skates	292,412	4,622		
Smelt	894,096	33,472		
Spanish mackerel			10,822	567
Splittail	24,420	650		
Squawfish	2,004	99		
Striped bass	537,376	45,883		
Suckers	6,525	52		
Swordfish	652,018	57,431	10,687	1,034
Tomcod	4,271	171		
Tuna and tunalike fishes:				
Albacore	619,694	31,062		
Bluefin	460,044	26,129	611,102	24,508
Bonito	1,711,422	30,692	1,150,864	22,773
Skipjack or striped tuna	375,042	10,349	21,261,535	741,150
Yellowfin	165,323	6,966	36,758,087	1,497,846
Whitebait	133,746	6,406		
Whitefish	149,491	7,399	12,536	654
Yellowtail	1,024,086	27,408	772,278	23,753
Other fish	148,973	2,457		
Total	369,019,529	2,435,574	61,784,866	2,382,052
SHELLFISH				
Crabs	2,434,132	201,733		
Sea crawfish or spiny lobster	319,307	45,061	699,340	97,337
Shrimp	2,682,789	40,512		
Abalone	563,469	77,386		
Clams:				
Cockle	36,722	8,636		
Pismo	27,576	7,297		
Razor	1,307	380		
Soft	61,410	13,978		
Mixed	158	45		
Mussels	23	13		
Octopus	21,187	1,472		
Oysters, market:				
Eastern	39,227	12,258		
Japanese	9,142	2,286		
Native	10,930	4,544		

[1] The catch of cod was taken in Alaska waters.

Fisheries of California, 1932—Continued

CATCH: BY WATERS—Continued

Species	Off California		Off Latin America	
	Pounds	*Value*	*Pounds*	*Value*
Squid	4,229,743	$30,514		
Turtles			5,728	$288
Total	10,437,122	446,115	705,068	97,625
WHALE PRODUCTS				
Whale meat	434,000	9,765		
Whale oil	503,100	6,500		
Total	937,100	16,265		
Grand total	380,393,751	2,897,954	62,489,434	2,479,077

Fisheries of the northern district of California, 1932

OPERATING UNITS: BY GEAR

Item	Haul seines	Gill nets		Lines		Dip nets	Traps		Shovels and rakes	Total, exclusive of duplication
		Drift, salmon	Other	Set and hand	Troll		Crab	Octopus		
Fishermen:	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*
On vessels				14	13					18
On boats and shore	47	159	8	55	216	43	25	1	8	418
Total	47	159	8	69	229	43	25	1	8	436
Vessels: Motor				6	6					8
Net tonnage				46	43					60
Boats:										
Motor	14		5	31	187		22	1		195
Other	11	105	1							111
Apparatus:										
Number	25	105	6	197	829	43	414	5	8	
Length, yards	1,971									
Square yards		96,600	5,472							
Hooks				34,916	3,881					

CATCH: BY GEAR

Species	Haul seines		Gill nets		Lines: Set and hand		Lines: Troll	
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Flounders:								
"Sole"					105	$3		
Other	11,854	$448			513	10		
Halibut					519,028	22,928	3,057	$119
Herring	8,699	191						
"Lingcod"	102	2			116,808	2,587	21,620	287
Perch	18,361	556						
Pilchard or sardine	140	2						
Rockfishes					88,966	1,753	268	5
Sablefish					576,181	10,433		
Salmon	37,554	993	592,445	$11,207			2,498,940	91,372
Sculpin					46	1		
Smelt	43,137	1,670	4,800	187				
Tomcod	28	1						
Tuna, and tunalike fishes, albacore							21	3
Whitebait	748	28	33	1				
Other fish					41,921	617	106	2
Total	120,623	3,891	597,278	11,395	1,343,568	38,332	2,524,010	91,788
SHELLFISH								
Octopus					120	5		
Grand total	120,623	3,891	597,278	11,395	1,343,688	38,337	2,524,010	91,788

Fisheries of the northern district of California, 1932—Continued

CATCH: BY GEAR—Continued

Species	Dip nets		Paranzella nets		Traps		Rakes and shovels	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
FISH								
Flounders:								
"Sole"			6,082,478	$177,887				
Other			392,300	14,412				
Grayfish			5,140	51				
Hake			10,143	152				
Halibut			123,743	5,556				
Kingfish			945	38				
"Lingcod"			326,904	6,538				
Perch	102	$4	150	7				
Rockfishes			300,663	6,013				
Sablefish			42,351	847				
Skates			27,108	407				
Smelt	17,616	364						
Tomcod			2,591	104				
Whitebait	90,544	3,367						
Other fish			77,669	1,165				
Total	108,262	3,735	6,392,185	213,177				
SHELLFISH								
Crabs					116,458	$9,165		
Clams:								
Cockle							74	$13
Soft							7,948	1,284
Mussels							18	12
Octopus			15	1	1,597	106		
Oysters, market, native							647	260
Total			15	1	118,055	9,271	8,687	1,569
Grand total	108,262	3,735	6,392,200	213,178	118,055	9,271	8,687	1,569

NOTE.—The catch by paranzella nets was made entirely by fishermen from the San Francisco district.

Fisheries of the San Francisco district of California, 1932

OPERATING UNITS: BY GEAR

Item	Lampara nets, sardine	Haul seines	Gill nets			
			Drift, salmon	Drift, sea bass	Drift, shad	Other
	Number	Number	Number	Number	Number	Number
Fishermen:						
On vessels	79					2
On boats and shore	84	7	363	15	348	88
Total	163	7	363	15	348	90
Vessels:						
Motor	8					1
Net tonnage	91					7
Boats:						
Motor	12	2	186	8	181	49
Other		2	6		5	4
Apparatus:						
Number	20	3	192	8	186	88
Length, yards	5,678	660				
Square yards			571,392	15,091	507,854	133,545

Fisheries of the San Francisco district of California, 1932—Continued

OPERATING UNITS: BY GEAR—Continued

Item	Lines: Set and hand	Lines: Troll	Fyke nets	Bag nets, shrimp	Paranzella nets	Dip nets
	Number	*Number*	*Number*	*Number*	*Number*	*Number*
Fishermen:						
On vessels	127	41		28	88	
On boats and shore	322	179	90	24		10
Total	449	220	90	52	88	10
Vessels:						
Motor	6	18		6	18	
Net tonnage	64	257		37	263	
Sail	3					
Net tonnage	1,124					
Total vessels	9	18		6	18	
Total net tonnage	1,188	257		37	263	
Boats:						
Motor	160	178	37	7		
Other	19		33			
Apparatus:						
Number	864	573	2,268	13	9	10
Length, yards				8,768		
Yards at mouth					150	
Hooks	59,456	3,289				

Item	Beam trawls	Traps, crab	Harpoons, whaling	Tongs	Shovels	Abalone outfits	Total, exclusive of duplication
	Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Fishermen:							
On vessels			16				306
On boats and shore	27	229		21	78	2	1,035
Total	27	229	16	21	78	2	1,341
Vessels:							
Steam			2				2
Net tonnage			41				41
Motor							32
Net tonnage							384
Sail							3
Net tonnage							1,124
Total vessels			2				37
Total net tonnage			41				1,549
Boats:							
Motor	27	226		8		1	573
Other				12			67
Apparatus:							
Number	27	4,460	2	21	78	1	
Yards at mouth	180						

Fisheries of the San Francisco district of California, 1932—Continued

CATCH: BY GEAR

Species	Purse seines		Lampara nets		Haul seines		Gill nets	
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Anchovies			147,545	$1,475	82	$1		
Carp					19,643	236	5,258	$108
Flounders:								
"California halibut"							78	4
Other			94	3	44	2	340	12
Grayfish			94	1				
Halibut			86	6				
Hardhead					106,277	7,667		
Herring			62,047	422	310,660	1,553	354,218	2,424
Kingfish			4,321	151			52	2
"Lingcod"			15	1			75	2
Mackerel			2,491	100			35	1
Perch			21,584	848	15,389	605	35,959	1,408
Pilchard or sardine	1,120,350	$1,961	28,233,448	71,823			3,970	40
Rockfishes					102	4		
Salmon							1,269,700	43,524
Sea bass, white			305	30	1,113	108	7,727	752
Shad							1,173,355	29,338
Smelt			31,693	1,427	37,619	1,706	217,400	9,874
Splittail					10,700	214		
Squawfish							166	8
Striped bass							269,803	18,599
Suckers					6,210	45		
Tomcod			20	1			50	2
Whitebait			20,352	1,628	1,672	134	2,281	182
Other fish			14	1			679	12
Total	1,120,350	1,961	28,524,109	77,917	509,511	12,275	3,341,146	106,292

Species	Lines				Fyke nets		Bag nets	
	Set and hand		Troll					
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Carp	321	$7			4,278	$87		
Catfish	110	12			253,917	27,558		
Cod	4,418,539	53,590						
Eels	208	8						
Flounders:								
"Sole"	5,025	176						
Other	3,596	180						
Grayfish	25,775	258	70	$1				
Hake	80	1						
Halibut	1,099	83						
Hardhead	18	1			4,262	372		
"Lingcod"	219,735	7,691	2,004	70				
Mackerel	530	21						
Perch	1,864	73						
Rockfishes	462,819	14,611	106	3				
Sablefish	41,427	1,139						
Salmon			219,581	8,950				
Sculpin	3,561	178						
Sea bass, white			67	6				
Smelt	20	1						
Splittail					13,720	436		
Squawfish	310	15			1,528	76		
Striped bass	267,573	27,284						
Suckers					315	7		
Other fish	2,329	35			33	2		
Total	5,454,939	105,364	221,828	9,030	278,053	28,538		
SHELLFISH								
Shrimp							1,300,416	$19,506
Octopus	1,649	115						
Total	1,649	115					1,300,416	19,506
Grand total	5,456,588	105,479	221,828	9,030	278,053	28,538	1,300,416	19,506

NOTE.—The catch by purse seines was made entirely by fishermen from the Monterey and San Pedro districts.

Fisheries of the San Francisco district of California, 1932—Continued

CATCH: BY GEAR—Continued

Species	Dip nets		Paranzella nets		Beam trawls		Traps	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
FISH								
Flounders:								
"California halibut"			311	$23				
"Sole"			3,090,546	108,169				
Other			723,997	22,934				
Grayfish			190,295	1,903				
Hake			13,211	199				
Halibut			14,590	1,096				
Kingfish			541	19				
"Lingcod"			80,398	2,814				
Perch	70	$3						
Rockfishes			200,167	7,000				
Sablefish			3,796	105				
Skates			205,272	3,079				
Smelt	1,736	156						
Tomcod			1,582	63				
Whitebait	4,012	293						
Other fish			14,825	222				
Total	5,818	452	4,539,531	147,626				
SHELLFISH								
Crabs			14,970	1,248			2,275,161	$189,625
Shrimp					1,381,391	$20,721		
Total			14,970	1,248	1,381,391	20,721	2,275,161	189,625
Grand total	5,818	452	4,554,501	148,874	1,381,391	20,721	2,275,161	189,625

Species	Harpoons		Tongs		Shovels		Abalone outfits	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
SHELLFISH								
Abalone							25	$5
Clams:								
Cockle					29,736	$7,122		
Soft					53,462	12,694		
Mixed					154	44		
Oysters, market:								
Eastern			39,227	$12,258				
Native			10,283	4,284				
Total			49,510	16,542	83,352	19,860	25	5
WHALE PRODUCTS								
Whalemeat	434,000	$9,765						
Whale oil	503,100	6,500						
Total	937,100	16,265						
Grand total	937,100	16,265	49,510	16,542	83,352	19,860	25	5

Fisheries of the Monterey district of California, 1932

OPERATING UNITS: BY GEAR

Item	Purse seines, sardine	Lampara nets		Gill nets		
		Sardine	Squid	Drift, sea bass	Set, "California halibut"	Other
	Number	*Number*	*Number*	*Number*	*Number*	*Number*
Fishermen:						
On vessels	233	254	90		2	
On boats and shore		211	232	29	37	97
Total	233	465	322	29	39	97
Vessels: Motor	22	21	14		1	
Net tonnage	915	238	140		7	
Boats:						
Motor		17	41	18	23	66
Other						7
Apparatus:						
Number	22	38	55	18	24	105
Length, yards	7,960	12,150	11,080			
Square yards				48,600	55,920	242,207

Fisheries of the Monterey district of California, 1932—Continued

OPERATING UNITS: BY GEAR—Continued

Item	Lines		Paranzella nets	Traps	Rakes and shovels	Abalone outfits	Total, exclusive of duplication
	Set and hand	Troll					
	Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Fishermen:							
On vessels	1	16	6			60	526
On boats and shore	190	198	12	7	41	10	627
Total	191	214	18	7	41	70	1,153
Vessels: Motor	1	10	1			12	53
Net tonnage	7	122	6			96	1,197
Boats:							
Motor	158	185	3	6		2	219
Other	23						24
Apparatus:							
Number	1,043	1,575	2	119	41	14	
Yards at mouth			33				
Hooks	147,269	3,433					

CATCH: BY GEAR

Species	Purse seines		Lampara nets		Gill nets	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
FISH						
Anchovies			118,628	$1,254	1,415	$15
Barracuda			25	2	2,943	191
Flounders:						
"California halibut"			1,019	73	42,849	3,053
"Sole"			183	7	6,244	231
Other			119	5	16,751	508
Grayfish			703	7	5,140	40
Herring			1,315	14	16,821	171
Horse mackerel	535	$24	104,325	4,670	10,856	486
Kingfish			57,045	2,016	63,536	2,245
"Lingcod"			309	12	3,814	143
Mackerel	1,006	20	218,700	4,374	281	6
Perch			40,676	1,545	13,976	531
Pilchard or sardine	128,162,280	308,082	40,110,326	114,005	11,695	117
Pompano			220	43	20	4
Rockfishes			1,609	52	679	21
Sculpin					665	8
Sea bass:						
Black					81	3
White			2,353	180	23,024	1,765
Shad					29	1
Skates			600	11	3,081	57
Smelt	810	30	29,915	1,128	127,843	4,818
Tuna and tunalike fishes:						
Bluefin					38	3
Bonito			10	1	21	1
Whitebait			7,935	435	6,156	337
Other fish			134	5	39	1
Total	128,164,631	308,156	40,696,149	129,839	357,998	14,756
SHELLFISH						
Crabs			42	2	27,266	1,679
Squid			4,075,262	26,994	12,359	267
Total			4,075,304	26,996	39,625	1,946
Grand total	128,164,631	308,156	44,771,453	156,835	397,623	16,702

Fisheries of the Monterey district of California, 1932—Continued

CATCH: BY GEAR—Continued

Species	Lines				Paranzella nets	
	Set and hand		Troll			
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
FISH						
Flounders:						
"California halibut"	2,802	$199	15	$1	3,722	$265
"Sole"	47,081	1,742			357,287	13,225
Other	16,989	544			59,061	1,868
Grayfish	100	4			2,320	23
Hake					4,893	49
Horse mackerel	3,552	159				
Kingfish	15,064	532			4,810	170
"Lingcod"	107,643	4,049	192	7	18,310	689
Mackerel	445,871	8,917	61	1		
Perch	4,130	150			703	27
Rockfishes	2,046,924	54,514			21,940	788
Sablefish	218,853	4,478			10,953	224
Salmon			80,884	5,692		
Sculpin	246	3				
Sea bass, white	255	20				
Skates	7,256	136			18,239	340
Smelt	29,893	1,130				
Tuna and tunalike fishes, albacore			606,313	30,211		
Whitebait	13	1				
Other fish	2,943	100			1,337	27
Total	2,949,615	76,678	687,465	35,912	503,575	17,695
SHELLFISH						
Crabs					90	5
Octopus	1,724	120				
Total	1,724	120			90	5
Grand total	2,951,339	76,798	687,465	35,912	503,665	17,700

Species	Traps		Rakes and shovels		Abalone outfits	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
SHELLFISH						
Shrimp	982	$285				
Abalone					427,075	$63,884
Clams:						
Cockle			13	$2		
Pismo			6,289	1,443		
Mixed			4	1		
Octopus	15,830	1,097				
Oysters, Japanese, market			9,142	2,286		
Total	16,812	1,382	15,448	3,732	427,075	63,884

Fisheries of the San Pedro district of California, 1932

OPERATING UNITS: BY GEAR

Item	Purse seines			Lampara nets			Haul seines
	Barracuda	Sardine	Tuna	Mackerel	Sardine	Other	
	Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Fishermen:							
On vessels	224	571	594	291	228	5	
On boats and shore				16		26	2
Total	224	571	594	307	228	31	2
Vessels: Motor	24	56	59	31	21	1	
Net tonnage	718	2,425	2,616	365	479	7	
Boats:							
Motor				2		6	
Other							1
Apparatus:							
Number	24	56	59	33	21	7	1
Length, yards	10,581	21,726	32,718	13,651	9,652	2,220	214

Fisheries of the San Pedro district of California, 1932—Continued

OPERATING UNITS: BY GEAR—Continued

Item	Gill nets: Drift, baracuda	Gill nets: Set, sea bass	Gill nets: Other	Trammel nets	Lines: Set and hand	Lines: Troll
	Number	*Number*	*Number*	*Number*	*Number*	*Number*
Fishermen:						
On vessels	23	21	5	23	570	6
On boats and shore	75	80	31	71	353	102
Total	98	101	36	94	923	108
Vessels: Motor	8	7	2	8	90	3
Net tonnage	46	74	14	51	3,573	47
Boats:						
Motor	29	33	17	27	240	83
Other		1	5	2	18	
Apparatus:						
Number	37	41	25	37	1,730	410
Square yards	361,280	180,072	25,995	281,163		
Hooks					282,729	430

Item	Paranzella nets	Traps, lobster	Harpoons, swordfish	Shovels and rakes	Abalone, outfits	Total, exclusive of duplication
	Number	*Number*	*Number*	*Number*	*Number*	*Number*
Fishermen:						
On vessels	14	22	41		10	1,623
On boats and shore	16	162	64	58	1	641
Total	30	184	105	58	11	2,264
Vessels: Motor	4	10	12		2	199
Net tonnage	57	68	163		14	6,930
Boats:						
Motor	6	107	28		1	351
Other		9				25
Apparatus:						
Number	10	4,291	40	58	3	
Yards at mouth	167					

CATCH OFF CALIFORNIA: BY GEAR

Species	Purse seines		Lampara nets		Haul seines		Gill nets	
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Anchovies			31,547	$629				
Barracuda	521,486	$34,677	199,115	12,215			282,108	$13,718
Flounders:								
"California halibut"	45	3	432	35			229	15
"Sole"			13	1			50	3
Other							19	1
Flyingfish	135	4	419	13			39,981	1,349
Grayfish	3,740	119	1,975	43			51,251	1,018
Herring							103	5
Horse mackerel	29,737	660	384,668	8,414			1,494	56
Kingfish			158,276	3,002			50	1
Mackerel	132,800	649	10,085,448	50,143			38,600	781
Mullet			1,047	59	144	$7	2,466	139
Perch	727	44	42,787	2,796			6,749	409
Pilchard or sardine	75,892,770	216,983	38,091,176	108,256	60	1	438	6
Pompano	14	6	5,303	2,014				
Rock bass	6,212	325	21,906	1,047			4,233	237
Rockfishes	635	30	1,124	40			114	5
Rudderfish	2,110	104	11,322	533			20,641	1,164
Sculpin	100	5					101	8
Sea bass:								
Black	294	12	2,003	74			8,517	324
White	141,276	9,240	47,145	4,362			338,508	27,203
Shad			87	3				
Sheepshead	30	1					1,412	35
Smelt	605	17	208,032	6,636	36,225	684	74,315	2,890

Fisheries of the San Pedro district of California, 1932—Continued

CATCH OFF CALIFORNIA: BY GEAR—Continued

Species	Purse seines		Lampara nets		Haul seines		Gill nets	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
FISH—continued								
Tuna and tunalike fishes:								
Bluefin	375,824	$21,407	61,408	$3,646			33	$3
Bonito	513,039	9,547	399,488	7,368			4,720	80
Yellowfin	21	1	23	2				
Whitefish	57	2	63	4			368	17
Yellowtail	366,815	10,769	279,846	6,566			7,415	236
Other fish	60	2	737	29			601	18
Total	77,988,532	304,607	50,035,390	217,930	36,429	$692	884,516	49,721
SHELLFISH								
Sea crawfish or spiny lobster	14	3					4	1
Squid	6,053	241	135,946	3,002				
Total	6,067	244	135,946	3,002			4	1
Grand total	77,994,599	304,851	50,171,336	220,932	36,429	692	884,520	49,722

Species	Trammel nets		Lines				Paranzella nets	
			Set and hand		Troll			
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
FISH								
Barracuda			784,670	$28,201	246,496	$8,907		
Eels			34	1				
Flounders:								
"California halibut"	439,662	$35,950	23,083	1,711			339,390	$25,201
"Sole"	11,583	469	2,550	98			284,180	8,529
Other	237	12	7,918	1,631			620	33
Grayfish	48,957	1,045	368,025	7,944	1,581	31	7,247	159
Hake			424	6				
Horse mackerel			1,242	28				
Kingfish			140,450	2,666				
"Lingcod"	14	1	1,957	65				
Mackerel			1,369,867	26,733	141	3		
Marlin			2,724	92				
Perch			2,249	137				
Rock bass	394	26	166,353	9,216	479	25	863	70
Rockfishes	126	5	1,837,733	62,552			3,368	145
Rudderfish			1,538	80				
Sablefish			81,543	2,966			209	11
Salmon					16	2		
Sculpin	80	5	71,270	4,823			171	14
Sea bass:								
Black	2,173	88	57,624	2,280			388	15
White	555	47	15,868	1,261	47	3	7	1
Sheepshead	5,470	138	26,756	690				
Skates	5,359	103	6,678	125			18,418	358
Smelt			1,569	64				
Swordfish			2,766	235				
Tuna, and tunalike fishes:								
Albacore			4,801	304	8,559	544		
Bluefin	22	1			2,071	31		
Bonito			46,236	730	181	6		
Skipjack or striped tuna			27,278	955				
Yellowfin			4,450	296				
Whitefish	112	6	60,224	3,539				
Yellowtail	424	12	101,497	3,146	7,784	222		
Other fish	199	6	5,313	211				
Total	515,367	37,914	5,223,690	162,786	267,355	9,774	654,921	34,536
SHELLFISH								
Sea crawfish or spiny lobster	8,788	1,379					346	41
Octopus	5	1	32	4				
Squid	8	1						
Total	8,801	1,381	32	4			346	41
Grand total	524,168	39,295	5,223,722	162,790	267,355	9,774	655,267	34,577

Fisheries of the San Pedro district of California, 1932—Continued

CATCH OFF CALIFORNIA: BY GEAR—Continued

Species	Traps		Harpoons		Shovels and rakes		Abalone outfits	
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Kingfish	137	$3						
Marlin			17,347	$699				
Perch	134	8						
Rock bass	47,582	2,523						
Rockfishes	184	6						
Sculpin	379	28						
Sheepshead	46,086	1,164						
Skates	22	1						
Swordfish			443,584	37,495				
Whitefish	873	50						
Other fish	12	1						
Total	95,409	3,784	460,931	38,194				
SHELLFISH								
Crabs	145	9						
Sea crawfish or spiny lobster	245,507	34,490						
Abalone							136,369	$13,497
Clams:								
Cockle					6,899	$1,499		
Pismo					21,287	5,854		
Razor					1,307	380		
Mussels					5	1		
Octopus	146	15						
Total	245,798	34,514			29,498	7,734	136,369	13,497
Grand total	341,207	38,298	460,931	38,194	29,498	7,734	136,369	13,497

CATCH OFF LATIN AMERICA: BY GEAR

Species	Purse seines		Haul seines		Gill nets	
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Barracuda	370,551	$31,226			845	$65
Cabrilla	1,317	52				
Flounders, "California halibut"	1,190	84			338	13
Pompano	488	64	3,240	$421		
Rock bass	998	51			135	7
Sea bass:						
Black	20,856	752			2,980	81
White	45,948	3,155			25,253	2,099
Tuna and tunalike fishes:						
Bluefin	608,170	24,328				
Bonito	1,139,808	22,559				
Skipjack or striped tuna	2,028,316	70,992				
Yellowfin	7,028,351	289,648				
Whitefish	509	31				
Yellowtail	349,635	9,011			548	18
Total	11,596,137	451,953	3,240	421	30,099	2,283

Species	Lines, set and hand		Traps		Harpoons	
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Barracuda	609	$57				
Cabrilla	101,672	3,406				
Corbina	2,469	99				
Groupers	3,774	113				
Rock bass	2,389	142				
Sea bass:						
Black	126,421	5,348				
White	8,200	795				
Sheepshead	41	1				
Spanish mackerel	3,209	192				
Swordfish					8,485	$787
Tuna and tunalike fishes:						
Skipjack or striped tuna	6,239,076	217,204				
Yellowfin	9,043,690	368,119				
Whitefish	1,765	101				
Yellowtail	174,462	6,715				
Total	5,707,777	602,292			8,485	787
SHELLFISH						
Sea crawfish or spiny lobster			25,066	$4,086		
Grand total	5,707,777	602,292	25,066	4,086	8,485	787

Fisheries of the San Diego district of California, 1932

OPERATING UNITS: BY GEAR

Item	Lampara nets, sardine	Gill nets: Drift, barracuda	Gill nets: Set, sea bass	Gill nets: Other	Trammel nets	Lines: Set and hand	Lines: Troll	Traps, lobster	Harpoons, swordfish and turtle	Total, exclusive of duplication
Fishermen:	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*
On vessels	33	6	6	3	12	734	3	23	50	742
On boats and shore	21	40	26	11	23	147	34	63	29	201
Total	54	46	32	14	35	881	37	86	79	943
Vessels: Motor	6	2	2	1	4	90	1	7	11	93
Net tonnage	57	12	12	13	34	5, 138	5	70	175	5, 160
Boats:										
Motor	4	16	12	9	9	76	30	47	13	119
Other				1		2		2		4
Apparatus:										
Number	10	18	14	14	13	1, 298	170	1, 938	24	
Length, yards	2, 380									
Square yards		182, 010	79, 981	13, 290	227, 624					
Hooks						87, 265	170			

CATCH OFF CALIFORNIA: BY GEAR

Species	Purse seines		Lampara nets		Gill nets		Trammel nets	
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Barracuda					118, 586	$7, 793		
Flounders:								
"California halibut"					29	2	67, 355	$5, 468
"Sole"							38	4
Grayfish					48, 228	188	61, 439	271
Herring					11, 861	205		
Kingfish					213	5		
"Lingcod"							12	1
Mackerel					9, 774	269		
Mullet			158	$7	16, 120	739		
Perch			867	18				
Pilchard or sardine			544, 932	4, 071	65	1		
Rock bass					712	19	58	3
Rockfishes					155	6	69	3
Rudderfish					1, 215	55		
Sculpin					125	8		
Sea bass:								
Black					2, 092	65	480	22
White					73, 140	4, 475	1, 030	91
Sheepshead							127	4
Skates							257	3
Smelt			622	32	30, 246	658		
Tuna and tunalike fishes:								
Bluefin	11, 922	$529	10, 797	540				
Bonito					10, 322	259		
Yellowtail					4, 270	234		
Total	11, 922	529	557, 376	4, 668	327, 153	14, 981	130, 865	5, 870
SHELLFISH								
Sea crawfish or spiny lobster							1, 918	271
Squid			115	9				
Total			115	9			1, 918	271
Grand total	11, 922	529	557, 491	4, 677	327, 153	14, 981	132, 783	6, 141

NOTE.—The catch by purse seines was made entirely by fishermen from the San Pedro district.

Fisheries of the San Diego district of California, 1932—Continued

CATCH OFF CALIFORNIA: BY GEAR—Continued

Species	Lines				Traps		Harpoons	
	Set and hand		Troll					
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
FISH								
Barracuda	305,601	$12,278	44,071	$2,806				
Flounders:								
"California halibut"	2,205	134						
"Sole"	1,531	143			48	$4		
Other	13	1						
Grayfish	28,690	145						
Kingfish	874	22			1,217	31		
Mackerel	168,641	2,643						
Marlin							4,320	$181
Rock bass	50,163	1,567	51	3	132,762	6,148		
Rockfishes	653,435	23,084			4,356	174		
Sculpin	12,966	762			470	30		
Sea bass:								
Black	157,432	4,822						
White	16,779	1,039	372	35				
Sheepshead	1,066	33			8,398	256		
Skates	62	1			60	1		
Swordfish							205,668	19,701
Tuna and tunalike fishes:								
Bonito	728,155	12,529	7,360	146				
Skipjack or striped tuna	347,448	9,384	135	4				
Yellowfin	159,716	6,621	1,113	46				
Whitefish	87,794	3,781						
Yellowtail	251,421	6,085	4,614	138				
Other fish	22	1						
Total	2,974,014	85,075	57,716	3,178	147,311	6,644	209,988	19,882
SHELLFISH								
Sea crawfish or spiny lobster					62,730	8,876		
Octopus	69	8						
Total	69	8			62,730	8,876		
Grand total	2,974,083	85,083	57,716	3,178	210,041	15,520	209,988	19,882

CATCH OFF LATIN AMERICA: BY GEAR

Species	Purse seines		Lampara nets		Gill nets		Trammel nets	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
FISH								
Barracuda					3,004	$240		
Flounders, "California halibut"					26	2	9,055	$963
Grayfish					118	1		
Mullet			1,665	$70	1,090	55		
Pilchard or sardine			66	1				
Pompano			348	28				
Rockfishes					186	4		
Sea bass:								
Black					4,259	167	2,361	113
White					45,016	3,250		
Tuna and tunalike fishes:								
Bluefin			2,992	180				
Bonito			1,210	24	17	1		
Skipjack or striped tuna	1,905	$67						
Yellowfin	371,287	15,637						
Whitefish					85	3		
Yellowtail	17,557	702			1,633	38		
Total	390,749	16,406	6,281	303	55,434	3,761	11,416	1,076

NOTE.—The catch by purse seines was made entirely by fishermen from the San Pedro district.

Fisheries of the San Diego district of California, 1932—Continued

CATCH OFF LATIN AMERICA: BY GEAR—Continued

Species	Lines				Traps		Harpoons	
	Set and hand		Troll					
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
FISH								
Barracuda	28,144	$2,178	18,521	$1,844				
Cabrilla	237,019	8,440						
Flounders, "California halibut"	92	7						
Groupers	14,915	533						
Marlin							285	$9
Rock bass	1,194	68	80	6				
Rockfishes	10,583	456						
Sea bass:								
Black	85,433	2,394						
White	12,763	876	253	25				
Sheepshead	205	6						
Spanish mackerel	7,613	375						
Swordfish							2,202	247
Tuna and tunalike fishes:								
Bonito	9,829	189						
Skipjack or striped tuna	12,992,238	452,887						
Yellowfin	20,309,024	824,213	5,735	229				
Whitefish	10,177	519						
Yellowtail	226,339	7,132	2,104	137				
Total	33,945,568	1,300,273	26,693	2,241			2,487	256
SHELLFISH								
Sea crawfish or spiny lobster					674,274	$93,251		
Turtles							5,728	288
Total					674,274	93,251	5,728	288
Grand total	33,945,568	1,300,273	26,693	2,241	674,274	93,251	8,215	544

HALIBUT FISHERY OF THE PACIFIC COAST[10]

The halibut fishery of the Pacific coast, which is prosecuted by United States (including Alaska) and Canadian vessels, ranks as one of the foremost fisheries of that section. During 1932, the total catch by vessels of both nationalities amounted to 43,458,000 pounds, valued at $1,740,000. This is an increase of 1 percent in amount, but a decrease of 39 percent in value as compared with the catch and its value in 1931. Of the total catch in 1932, 85 percent was taken by United States craft and 15 percent by Canadian craft. Considered according to ports of landing, 39 percent was landed at Canadian ports, 50 percent at ports in the State of Washington, and 11 percent at ports in Alaska.

[10] These statistics were compiled from data collected by the International Fisheries Commission for Washington and British Columbia, and by Bureau agents for Alaska. The data for the Washington and Alaska landings as well as those landings made by United States craft in British Columbia are based on actual weight of the fares. In previous data "hailing-fares" were used for British Columbia.

Halibut fishery of the Pacific coast, 1932

UNITED STATES OPERATING UNITS: BY FLEET CLASSIFICATION

Item	Washington fleet	Alaska fleet	Total
Regular halibut vessels:			
Number	125	78	203
Net tonnage	3,614	1,490	5,104
Crew	920	405	1,325
Dories	146	78	224
Skates of lines	3,978	1,978	5,956
Vessels in other fisheries but landing one or more fares of halibut:			
Number	18	28	46
Net tonnage	287	400	687
Crew	83	111	194
Dories	15	24	39
Skates of lines	405	620	1,025
Regular halibut boats:			
Number		19	19
Crew		47	47
Skates of lines		340	340
Boats in other fisheries but landing one or more fares of halibut:			
Number	5	88	93
Crew	8	142	150
Skates of lines	30	572	602

CATCH OF ALL SPECIES: BY UNITED STATES VESSELS AND BOATS

Fleet classification	Landed in—						Total	
	Washington		British Columbia		Alaska			
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
WASHINGTON FLEET								
Regular vessels:								
Halibut	19,891,191	$911,831	3,022,197	$120,655	206,687	$6,671	23,120,075	$1,039,157
Sablefish	1,631,729	40,721					1,631,729	40,721
"Lingcod"	326,622	9,695					326,622	9,695
Rockfishes	212,534	6,359					212,534	6,359
Total	22,062,076	968,606	3,022,197	120,655	206,687	6,671	25,290,960	1,095,932
Other vessels and boats:								
Halibut	376,256	16,289					376,256	16,289
Sablefish	24,753	466					24,753	466
"Lingcod"	47,627	1,211					47,627	1,211
Rockfishes	13,144	502					13,144	502
Total	461,780	18,468					461,780	18,468
ALASKA FLEET								
Regular vessels:								
Halibut	1,480,900	64,626	7,159,773	279,921	2,892,001	83,736	11,532,674	428,283
Sablefish	34,923	835			3,357	63	38,280	898
"Lingcod"	4,703	89					4,703	89
Rockfishes	4,971	95			3,469	69	8,440	164
Total	1,525,497	65,645	7,159,773	279,921	2,898,827	83,868	11,584,097	429,434
Other vessels and boats:								
Halibut	92,601	2,888	462,721	17,636	1,464,300	44,245	2,019,622	64,769
Sablefish					1,035	21	1,035	21
Total	92,601	2,888	462,721	17,636	1,465,335	44,266	2,020,657	64,790
COMBINED FLEETS								
Regular vessels:								
Halibut	21,372,091	976,457	10,181,970	400,576	3,098,688	90,407	34,652,749	1,467,440
Sablefish	1,666,652	41,556			3,357	63	1,670,009	41,619
"Lingcod"	331,325	9,784					331,325	9,784
Rockfishes	217,505	6,454			3,469	69	220,974	6,523
Total	23,587,573	1,034,251	10,181,970	400,576	3,105,514	90,539	36,875,057	1,525,366

Halibut fishery of the Pacific coast, 1932—Continued

CATCH OF ALL SPECIES: BY UNITED STATES VESSELS AND BOATS—Continued

Fleet classification	Landed in—						Total	
	Washington		British Columbia		Alaska			
COMBINED FLEETS—con.								
Other vessels and boats:	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Halibut	468,857	$19,177	462,721	$17,636	1,464,300	$44,245	2,395,878	$81,058
Sablefish	24,753	466			1,035	21	25,788	487
"Lingcod"	47,627	1,211					47,627	1,211
Rockfishes	13,144	502					13,144	502
Total	554,381	21,356	462,721	17,636	1,465,335	44,266	2,482,437	83,258
All vessels and boats:								
Halibut	21,840,948	995,634	10,644,691	418,212	4,562,988	134,652	37,048,627	1,548,498
Sablefish	1,691,405	42,022			4,392	84	1,695,797	42,106
"Lingcod"	378,952	10,995					378,952	10,995
Rockfishes	230,649	6,956			3,469	69	234,118	7,025
Grand total	24,141,954	1,055,607	10,644,691	418,212	4,570,849	134,805	39,357,494	1,608,624

CATCH OF HALIBUT: BY UNITED STATES AND CANADIAN VESSELS AND BOATS

[Expressed in thousands of pounds and thousands of dollars; that is, 000 omitted]

Fleet classification	Landed in—						Total	
	Washington		British Columbia		Alaska			
WASHINGTON FLEET	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
Regular halibut vessels	19,891	912	3,022	120	207	7	23,120	1,039
Other vessels and boats	376	16					376	16
Total	20,267	928	3,022	120	207	7	23,496	1,055
ALASKA FLEET								
Regular halibut vessels	1,481	64	7,160	280	2,892	84	11,533	428
Other vessels and boats	93	3	463	18	1,464	44	2,020	65
Total	1,574	67	7,623	298	4,356	128	13,553	493
COMBINED FLEET								
Regular halibut vessels	21,372	976	10,182	400	3,099	91	34,653	1,467
Other vessels and boats	469	19	463	18	1,464	44	2,396	81
Total	21,841	995	10,645	418	4,563	135	37,049	1,548
British Columbia fleet			6,409	[1] 192			6,409	192
Grand total	21,841	995	17,054	610	4,563	135	43,458	1,740

[1] Estimated.

NOTE.—In addition to the above it is estimated that about 500,000 pounds of halibut livers, valued at about $60,000 were landed at Pacific coast ports during 1932.

VESSEL FISHERIES AT SEATTLE, WASH.

A total of 42,266,096 pounds of fishery products, valued at $1,797,611, were handled by Seattle wholesale dealers, exclusive of quantities received by transporting vessels or by rail from Alaska or Canada. This represents an increase of 4 percent in quantity, but a decrease of 22 percent in value as compared with the quantity of products handled and its value for the previous year. Of the total quantity handled, 24,141,954 pounds, valued at $1,055,607, were landed by fishing vessels, an increase of 40 percent in quantity but a decrease of 10 percent in value as compared with the previous year. Receipts by wholesale dealers from sources other than Alaska or Canada or from vessels in the halibut fleet, amounted to 18,124,142 pounds, valued at $742,004, which was a decrease of 23 percent in quantity and 35 percent in value as compared with the previous year.

Fishery products landed by United States vessels at Seattle, Wash., 1932 [1]

BY FISHING GROUNDS

Fishing grounds	Trips	Halibut				Sablefish	
		No. 1		No. 2			
	Number	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
West of Cape Spencer	382	7,306,517	$409,454	5,626,290	$185,293	15,693	$300
South of Cape Spencer	814	2,989,426	199,029	5,918,715	201,858	1,675,712	41,722
Total	1,196	10,295,943	608,483	11,545,005	387,151	1,691,405	42,022

Fishing grounds	"Lingcod"		Rockfishes		Total	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
West of Cape Spencer	4,636	$68	5,457	$113	12,958,593	$595,228
South of Cape Spencer	374,316	10,927	225,192	6,843	11,183,361	460,379
Total	378,952	10,995	230,649	6,956	24,141,954	1,055,607

[1] Halibut fleet.

BY MONTHS

Months	Trips	Halibut				Sablefish	
		No. 1		No. 2			
	Number	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
January	9						
February	28	181,987	$19,856	85,141	$6,800	3,571	$132
March	146	1,568,627	88,369	1,004,273	30,790	19,340	535
April	149	1,238,369	81,732	1,255,860	49,481	17,469	652
May	159	1,266,356	67,244	1,680,630	51,595	58,363	2,238
June	142	1,219,566	67,929	1,450,513	42,935	234,715	7,616
July	104	906,650	51,316	1,109,971	35,852	238,062	6,086
August	121	1,167,319	59,767	1,774,882	50,229	147,141	3,721
September	129	991,887	61,799	1,223,285	44,291	408,976	9,894
October	156	1,201,929	72,879	1,509,487	53,450	460,566	9,271
November	45	553,253	37,592	450,963	21,728	103,202	1,877
December	8						
Total	1,196	10,295,943	608,483	11,545,005	387,151	1,691,405	42,022

Months	"Lingcod"		Rockfishes		Total	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
January	28,900	$1,849	17,270	$1,138	46,170	$2,987
February	64,760	2,141	28,690	1,259	364,149	30,188
March	18,694	527	9,367	341	2,620,301	120,562
April	44,395	835	15,452	494	2,571,545	133,194
May	37,488	648	26,523	542	3,069,360	122,267
June	24,872	468	12,967	274	2,942,633	119,222
July	12,311	234	19,536	380	2,286,530	93,868
August	17,964	310	23,678	470	3,130,984	114,497
September	24,682	501	21,525	427	2,670,355	116,912
October	29,461	589	26,290	538	3,227,733	136,727
November	19,674	574	6,411	195	1,133,503	61,966
December	55,751	2,319	22,940	898	78,691	3,217
Total	378,952	10,995	230,649	6,956	24,141,954	1,055,607

Fishery products received by Seattle wholesale dealers, 1932 [1]

BY MONTHS

Species	January		February		March		April		May	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Flounders:										
"Sole"	32,721	$628	55,528	$1,386	45,900	$1,196	23,471	$512	22,190	$476
Other	7,473	117	4,000	50	2,938	80	1,200	15	635	6
Halibut					85	3	3,411	170	5,742	225
Herring	500	5			10,000	50				
"Lingcod"	5,073	233	13,190	404	2,961	77	12,373	249	6,939	132
Perch	4,336	173	5,090	197	5,109	179	7,141	125	3,228	93
Rockfishes	6,812	281	21,896	837	4,092	126	10,450	224	8,067	240
Salmon:										
Blueback, red or sockeye									1,029	71
Chinook or king			1,391	195	56,098	7,407	239,072	21,351	1,285,586	69,951
Chum or keta									76	1
Silver or coho									23,379	909
Smelt	4,716	292	10,950	110	10,606	318			5,687	445
Steelhead trout	5,113	511	10,617	1,274	1,992	199			14,137	766
Sturgeon	238	29	79	10	184	20			95	12
Crabs	67,038	3,215	77,616	4,143	70,558	3,744	80,260	4,497	125,571	7,021
Octopus	5,963	233	5,172	155	3,349	86	6,894	248	5,757	105
Total	139,983	5,717	205,529	8,761	213,872	13,485	384,272	27,391	1,508,118	80,453

Species	June		July		August		September	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Flounders:								
"Sole"	22,225	$439	12,025	$285	5,870	$148	15,550	$294
Other	220	1					140	1
Halibut	22,683	900	33,628	1,315	56,307	1,761	2,210	128
"Lingcod"	8,712	114	7,277	96	2,181	31	1,318	21
Perch	129	4	1,034	39	2,732	72	5,889	120
Rockfishes	5,660	110	7,561	252	3,622	109	3,863	95
Sablefish	635	20						
Salmon:								
Blueback, red or sockeye	8,860	532	4,828	245	6,720	403	1,264	76
Chinook or king	2,202,345	126,475	2,083,147	110,633	1,528,587	87,515	347,742	18,227
Chum or keta	253	3	450	9	30,454	456	141,002	2,098
Humpback or pink			105	3	6,585	66	440	5
Silver or coho	192,512	8,255	529,418	21,009	1,111,877	44,474	967,258	30,098
Smelt	14,589	460	27,850	910	23,930	661	42,689	1,328
Steelhead trout	13,310	567	9,117	457	15,267	452	12,018	459
Sturgeon	443	44			1,193	60	515	26
Crabs	58,544	3,414	51,198	3,047	29,922	1,641	8,348	557
Octopus	3,727	112	3,309	100	852	26	5,429	109
Total	2,554,847	141,450	2,770,947	138,400	2,826,099	137,875	1,555,675	53,642

Species	October		November		December		Total	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Flounders:								
"Sole"	25,371	$633	26,656	$587	48,739	$1,311	336,246	$7,895
Other			490	5	4,102	58	21,198	333
Halibut	1,227	75	290	18			125,583	4,595
Herring			10,490	157	9,153	171	30,143	383
"Lingcod"	1,626	39	2,532	51	16,921	1,041	81,103	2,488
Perch	3,397	68	4,470	112	4,326	134	46,881	1,316
Rockfishes	6,879	207	3,958	116	22,000	1,000	104,860	3,597
Sablefish	4,605	138					5,240	158
Salmon:								
Blueback, red or sockeye							22,701	1,327
Chinook or king	68,884	3,507	11,522	507			7,824,374	445,768
Chum or keta	2,283,525	31,908	1,216,485	10,900	1,730	107	3,673,975	45,482
Humpback or pink							7,130	74
Silver or coho	1,495,141	50,539	206,906	6,207	74,317	3,902	4,600,808	165,393
Smelt	21,912	736	18,770	872	9,635	498	191,334	6,630
Steelhead trout	1,962	65	14,159	708	15,742	945	113,434	6,403
Sturgeon	175	11			30	2	2,952	214
Crabs	102,964	4,741	90,400	4,872	113,520	7,326	[2] 875,939	48,218
Octopus	5,050	51	6,674	133	8,065	372	60,241	1,730
Total	4,022,718	92,718	1,613,802	25,245	328,280	16,867	18,124,142	742,004

[1] This tabulation does not include fish received from Alaska or Canada or vessels in the halibut fleet.
[2] 41,663 dozen.

LAKE FISHERIES [11]

The yield of the United States fisheries of the Great Lakes including the international lakes of northern Minnesota during 1932, amounted to 83,744,389 pounds, valued at $4,331,776 to the fishermen, representing a decrease of 9 percent in quantity and 28 percent in value as compared with the catch in the previous year. These fisheries gave employment to 6,932 fishermen or 1 percent more than in 1931.

Lake fisheries of the United States and Canada, 1932

CATCH: BY LAKES

Species	Lake Ontario			Lake Erie		
	United States	Canada	Total	United States	Canada	Total
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Blue pike	80,785	91,900	172,685	9,866,679	3,962,100	13,828,779
Bowfin	-	-	-	184	(1)	184
Burbot	20,343	(1)	20,343	251,521	(1)	251,521
Carp	54,457	49,900	104,357	2,878,130	510,800	3,388,930
Catfish and bullheads	66,137	201,400	267,537	622,293	83,300	705,593
Cisco	-	-	-	160,215	851,200	1,011,415
Eels	43,536	50,100	93,636	-	-	-
Goldfish	-	-	-	48,533	(1)	48,533
Lake herring	72,793	651,400	724,193	-	-	-
Lake trout	18,286	301,600	319,886	9,740	1,800	11,540
Mooneye	-	-	-	15,684	(1)	15,684
Pike or pickerel (jacks)	14,853	170,200	185,053	7,603	55,200	62,803
Rock bass	1,092	(1)	1,092	5,890	(1)	5,890
Sauger	-	-	-	3,142,213	(1)	3,142,213
Sheepshead	-	-	-	2,144,323	(1)	2,144,323
Sturgeon	11,627	2,530	14,157	16,901	28,142	45,043
Sucker "mullet"	35,585	(1)	35,585	1,325,253	(1)	1,325,253
Sunfish	8,084	(1)	8,084	-	-	-
White bass	-	-	-	252,695	(1)	252,695
Whitefish, common	54,635	418,300	472,935	1,168,570	912,200	2,080,770
Yellow perch	27,044	98,100	125,144	9,733,201	5,029,000	14,762,201
Yellow pike	12,022	16,000	28,022	2,020,057	296,900	2,316,957
Miscellaneous	-	204,700	204,700	-	1,003,000	1,003,000
Total	521,279	2,256,130	2,777,409	33,669,685	12,733,642	46,403,327

[1] Where there has been a Canadian catch of these species it is included under Miscellaneous.

[11] The statistics of the catch presented herewith were obtained principally from the records of the various State fishery agencies and from the Dominion Bureau of Statistics, Ottawa, Canada. The data for the operating units (fishermen, vessels, boats, and gear) of the United States were obtained largely by Bureau agents in a special canvass; although State records in several instances were very helpful in this work. In all cases the statistics collected are for the calendar year, except for Lake of the Woods, Rainy Lake, and Lake Namakan in Minnesota, which are for 2 seasons. For Lake of the Woods the seasons are from June 1 to Nov. 1 and Dec. 1 to Apr. 1 and for Rainy and Namakan Lakes from May 15 to Nov. 1 and Dec. 1 to Apr. 1. The catches for these 2 seasons, in the order named, have been combined to constitute a year. The quantity of fish taken in these lakes between Jan. 1 and Apr. 1 is estimated at less than 3 percent of the total catch.

Lake fisheries of the United States and Canada, 1932—Continued

CATCH: BY LAKES—Continued

Species	Lake Huron			Lake Michigan	Lake Superior		
	United States	Canada	Total	United States	United States	Canada	Total
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Blue pike		2,000	2,000				
Bowfin	2,764	[1]	2,764				
Buffalofish				1,910			
Burbot	692	[1]	692	55,154	3,361	[1]	3,361
Carp	1,055,068	55,800	1,110,868	283,895	5,149	1,100	6,249
Catfish and bullheads	80,166	6,700	86,866	55,356			
Chubs	507,121	1,421,900	1,929,021	3,129,108	392,413	205,000	597,413
Lake herring	2,646,662	366,400	3,013,062	2,941,084	6,025,835	757,100	6,782,935
Lake trout	2,220,624	2,968,400	5,189,024	5,491,780	2,920,594	1,123,700	4,044,294
Pike or pickerel (jacks)	33,194	189,900	223,094	33,387	63,933	15,100	79,033
Rock bass	8,455	[1]	8,455	2,063			
Sauger	67,878	[1]	67,878	16,015	5,575	[1]	5,575
Sheepshead	1,925	[1]	1,925	12,245	11	[1]	11
Smelt				97,807			
Steelhead trout				5,050			
Sturgeon		17,331	17,331			2,800	2,800
Sucker "mullet"	2,592,791	[1]	2,592,791	1,909,402	208,458	[1]	208,458
Whitefish:							
Common	4,332,874	1,582,000	5,914,874	3,557,604	450,569	[1]	450,569
Menominee	30,006	[1]	30,006	127,187	75,481	[1]	75,481
Yellow perch	700,094	39,800	739,894	953,609	16,922	[1]	16,922
Yellow pike	1,568,044	406,000	1,974,044	105,107	4,890	116,900	121,790
Crawfish				19,677			
Mussel shells				1,894,914			
Miscellaneous		423,000	423,000			72,700	72,700
Total	15,848,358	7,479,231	23,327,589	20,692,354	10,173,191	2,294,400	12,467,591

Species	Namakan Lake			Rainy Lake		
	United States	Canada	Total	United States	Canada	Total
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Chubs	18,437	[1]	18,437	9,433	4,625	14,058
Crappie	781	[1]	781			
Pike or pickerel (jacks)	31,200	1,070	32,270	37,822	135,683	173,505
Sturgeon		1,070	1,070	502	1,168	1,670
Sucker "mullet"	1,929	[1]	1,929	224	[1]	224
Tullibee				200		200
Whitefish, common	24,345	10,275	34,620	124,549	19,331	143,880
Yellow perch	1,414	[1]	1,414	3,743	6,270	10,013
Yellow pike	27,657	7,835	35,492	77,912	192,930	270,842
Miscellaneous					5,408	5,408
Total	105,763	20,250	126,013	254,385	365,415	619,800

Species	Lake of the Woods			Total, all lakes		
	United States	Canada	Total	United States	Canada	Total
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Blue pike		1,195	1,195	9,947,464	4,057,195	14,004,659
Bowfin				2,948	[1]	2,948
Buffalofish				1,910	[1]	1,910
Burbot	45	[1]	45	331,116	[1]	331,116
Carp	6,870	1,691	8,561	4,283,569	619,291	4,902,860
Catfish and bullheads	9,412	2,069	11,481	833,364	293,469	1,126,833
Chubs				4,056,512	1,631,525	5,688,037
Cisco				160,215	851,200	1,011,415
Crappie	237	[1]	237	1,018	[1]	1,018
Eels				43,536	50,100	93,636
Goldfish				48,533	[1]	48,533
Lake herring				11,686,374	1,774,900	13,461,274
Lake trout	688	25,575	26,263	10,661,712	4,421,075	15,082,787
Mooneye				15,684	[1]	15,684
Pike or pickerel (jacks)	150,564	482,220	632,784	372,556	1,049,373	1,421,929

[1] Where there has been a Canadian catch of these species it is included under Miscellaneous.

Lake fisheries of the United States and Canada, 1932—Continued

CATCH: BY LAKES—Continued

Species	Lake of the Woods			Total, all lakes		
	United States	Canada	Total	United States	Canada	Total
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Rock bass				17,500	(1)	17,500
Sauger	215,898	(1)	215,898	3,447,579	(1)	3,447,579
Sheepshead				2,158,504	(1)	2,158,504
Smelt				97,807	(1)	97,807
Steelhead trout				5,050	(1)	5,050
Sturgeon	882	475	1,357	29,912	53,516	83,428
Sucker "mullet"	118,718	(1)	118,718	6,192,360	(1)	6,192,360
Sunfish				8,084	(1)	8,084
Tullibee	1,296,468	14,080	1,310,548	1,296,668	14,080	1,310,748
White bass				252,695	(1)	252,695
Whitefish:						
Common	17,358	479,248	496,606	9,730,504	3,421,354	13,151,858
Menominee				232,674	(1)	232,674
Yellow perch	36,473	4,660	41,133	11,472,500	5,177,830	16,650,330
Yellow pike	625,761	696,803	1,322,564	4,441,450	1,733,368	6,174,818
Crawfish				19,677	(1)	19,677
Mussel shells				1,894,914	(1)	1,894,914
Miscellaneous		73,670	73,670		1,782,478	1,782,478
Total	2,479,374	1,781,686	4,261,060	83,744,389	26,930,754	110,675,143

1 Where there has been a Canadian catch of these species it is included under Miscellaneous.

Lake fisheries of the United States, 1932

OPERATING UNITS: BY LAKES

Item	Lake Ontario	Lake Erie	Lake Huron	Lake Michigan	Lake Superior	Lake of the Woods, Rainy Lake, and Namakan Lake	Total
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels	2	293	246	1,029	135		1,705
On boats and shore:							
Regular	78	823	756	834	473	95	3,059
Casual	55	363	226	1,064	459	1	2,168
Total	135	1,479	1,228	2,927	1,067	96	6,932
Vessels:							
Steam		24	16	59	7		106
Net tonnage		647	319	1,244	154		2,364
Motor	1	33	50	271	37		392
Net tonnage	12	314	541	2,892	296		4,055
Total vessels	1	57	66	330	44		498
Total net tonnage	12	961	860	4,136	450		6,419
Boats:							
Motor	51	305	341	569	285	73	1,624
Other	59	422	115	580	359		1,535
Apparatus:							
Haul *seines*	5	197	69	53	8		332
Length, yards	1,165	89,323	30,004	17,479	1,125		139,096
Gill nets:							
"Bull", 3 to 3 1/16 inches		584					584
Square yards		233,600					233,600
"Shoal", 2¼ to 3⅞ inches	688	11,945	1,793	16,996	6,687		38,109
Square yards	131,791	1,856,075	572,563	1,174,411	2,062,662		8,797,502
"Shoal", 4 to 5¾ inches	451	6,685	6,311	42,090	8,411	249	64,197
Square yards	78,884	1,412,759	2,260,612	11,563,102	3,124,189	99,102	18,538,648
"Shoal", *6 to 9¾ inches*	142			414			556
Square yards	26,464			54,449			80,913
"Shoal", 10 to 14 inches	12	60					72
Square yards	6,630	10,170					16,800

Lake fisheries of the United States, 1932—Continued

OPERATING UNITS: BY LAKES—Continued

Item	Lake Ontario	Lake Erie	Lake Huron	Lake Michigan	Lake Superior	Lake of the Woods, Rainy Lake, and Namakan Lake	Total
	Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Trammel nets		222		4			226
Square yards		9,324		413			9,737
Lines:							
Hand		1			5		6
Hooks		2			5		7
Troll			5	7	29		41
Hooks			10	7	29		46
Trot	24	45	95	687	2,198		3,049
Hooks	7,560	9,990	147,700	380,000	415,210		960,460
Pound nets		63	747	814	136	73	1,833
Trap nets	152	4,073	2,636	441	124		7,426
Fyke nets	131	1,114	398	791	24	116	2,574
Crawfish pots				2,910			2,910
Crowfoot bars				360			360
Picks				126			126

OPERATING UNITS: BY STATES AND LAKES

Item	New York			Pennsylvania	Ohio
	Lake Ontario	Lake Erie	Total	Lake Erie	Lake Erie
	Number	*Number*	*Number*	*Number*	*Number*
Fishermen:					
On vessels	2	83	85	112	96
On boats and shore:					
Regular	78	20	98	24	601
Casual	55	75	130		249
Total	135	178	313	136	946
Vessels:					
Steam		5	5	12	7
Net tonnage		122	122	298	227
Motor	1	11	12	9	12
Net tonnage	12	75	87	95	138
Total vessels	1	16	17	21	19
Total net tonnage	12	197	209	393	365
Boats:					
Motor	51	20	71	7	251
Other	59	56	115	10	300
Apparatus:					
Haul seines	5	13	18		123
Length, yards	1,165	1,025	2,190		70,485
Gill nets:					
"Bull", 3 to 3 1/16 inches		584	584		
Square yards		233,600	233,600		
"Shoal", 2¼ to 3⅞ inches	688	1,321	2,009	4,494	6,001
Square yards	131,791	183,122	314,913	741,840	919,050
"Shoal", 4 to 5¾ inches	451	2,300	2,751	3,684	563
Square yards	78,884	376,804	455,688	933,104	84,450
"Shoal", 6 to 9¾ inches	142		142		
Square yards	26,464		26,464		
"Shoal", 10 to 14 inches	12	60	72		
Square yards	6,630	10,170	16,800		
Trammel nets					222
Square yards					9,324
Lines:					
Trot	24	38	62		
Hooks	7,560	6,490	14,050		
Pound nets				45	18
Trap nets	152	21	173	8	3,875
Fyke nets	131		131		633

Lake fisheries of the United States, 1932—Continued

OPERATING UNITS: BY STATES AND LAKES—Continued

Item	Michigan					Indiana
	Lake Erie	Lake Huron	Lake Michigan	Lake Superior	Total	Lake Michigan
	Number	*Number*	*Number*	*Number*	*Number*	*Number*
Fishermen:						
On vessels	2	246	490	86	824	15
On boats and shore:						
Regular	178	756	510	260	1,704	10
Casual	39	226	497	108	870	49
Total	219	1,228	1,497	454	3,398	74
Vessels:						
Steam	----------	16	28	7	51	1
Net tonnage	----------	319	453	154	926	22
Motor	1	50	120	18	189	3
Net tonnage	6	541	1,146	125	1,818	41
Total vessels	1	66	148	25	240	4
Total net tonnage	6	860	1,599	279	2,744	63
Boats:						
Motor	27	341	348	163	879	51
Other	56	115	364	20	555	33
Apparatus:						
Haul seines	61	69	3	8	141	----------
Length, yards	17,813	30,004	650	1,125	49,592	----------
Gill nets:						
"Shoal", 2¼ to 3⅞ inches	129	1,793	5,699	1,815	9,436	361
Square yards	12,063	572,563	1,224,695	351,286	2,160,607	105,750
"Shoal", 4 to 5¾ inches	138	6,311	27,317	5,687	39,453	440
Square yards	18,401	2,260,612	6,911,198	2,173,068	11,363,279	129,167
"Shoal", 6 to 9¾ inches	----------	----------	344	----------	344	30
Square yards	----------	----------	41,549	----------	41,549	6,300
Lines:						
Hand	1	----------	----------	5	6	----------
Hooks	2	----------	----------	5	7	----------
Troll	----------	5	7	29	41	----------
Hooks	----------	10	7	29	46	----------
Trot	7	95	142	1,519	1,763	----------
Hooks	3,500	147,700	204,350	315,080	670,630	----------
Pound nets	----------	747	576	72	1,395	7
Trap nets	169	2,636	441	119	3,365	----------
Fyke nets	481	398	48	8	935	----------
Crowfoot bars	----------	----------	315	----------	315	40
Picks	----------	----------	124	----------	124	----------

Item	Illinois	Wisconsin			Minnesota		
	Lake Michigan	Lake Michigan	Lake Superior	Total	Lake Superior	Lake of the Woods, Rainy Lake, and Namakan Lake	Total
	Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Fishermen:							
On vessels	48	476	49	525	----------	----------	----------
On boats and shore:							
Regular	2	312	56	368	157	95	252
Casual	10	508	130	638	221	1	222
Total	60	1,296	235	1,531	378	96	474
Vessels:							
Steam	1	29	----------	29	----------	----------	----------
Net tonnage	13	756	----------	756	----------	----------	----------
Motor	13	135	19	154	----------	----------	----------
Net tonnage	183	1,522	171	1,693	----------	----------	----------
Total vessels	14	164	19	183	----------	----------	----------
Total net tonnage	196	2,278	171	2,449	----------	----------	----------

Lake fisheries of the United States, 1932—Continued

OPERATING UNITS: BY STATES AND LAKES—Continued

Item	Illinois	Wisconsin			Minnesota		
	Lake Michigan	Lake Michigan	Lake Superior	Total	Lake Superior	Lake of the Woods, Rainy Lake, and Namakan Lake	Total
Boats:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Motor	7	163	81	244	41	73	114
Other		183	35	218	304		304
Apparatus:							
Haul seines		50		50			
Length, yards		16,829		16,829			
Gill nets:							
"Shoal", 2¼ to 3⅞ inches	1,380	9,556	1,258	10,814	3,614		3,614
Square yards	288,640	2,555,326	514,973	3,070,299	1,196,403		1,196,403
"Shoal", 4 to 5¾ inches	1,122	13,211	1,155	14,366	1,569	249	1,818
Square yards	338,668	4,184,069	364,798	4,548,867	586,323	99,102	685,425
"Shoal", 6 to 9¾ inches		40		40			
Square yards		6,600		6,600			
Trammel nets		4		4			
Square yards		413		413			
Lines:							
Trot	5	540	276	816	403		403
Hooks	500	175,150	61,200	236,350	38,930		38,930
Pound nets	1	230	64	294		73	73
Trap nets			5	5			
Fyke nets		743	16	759		116	116
Crawfish pots		2,910		2,910			
Crowfoot bars		5		5			
Picks		2		2			

OPERATING UNITS OF LAKE ONTARIO:[1] BY GEAR

Item	Haul seines	Gill nets				Trot lines	Trap nets	Fyke nets	Total, exclusive of duplication
		"Shoal", 2¼ to 3⅞ inches	"Shoal", 4 to 6 inches	"Shoal", 6 to 10 inches	"Shoal", 10 to 14 inches				
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels		2							2
On boats and shore:									
Regular	8	41	29	16	2	3	31	17	78
Casual	6	17	6	4	4	20	5	2	55
Total	14	60	35	20	6	23	36	19	135
Vessels, motor	1								1
Net tonnage	12								12
Boats:									
Motor	1	31	19	9	2	6	15	6	51
Other	5	13	8	6	3	17	19	11	59
Apparatus:									
Number	5	688	451	142	12	24	152	131	
Length, yards	1,165								
Square yards		131,791	78,884	26,464	6,630				
Hooks						7,560			

[1] Includes Niagara River below the Falls and the St. Lawrence River.

Lake fisheries of the United States, 1932—Continued

OPERATING UNITS OF LAKE ERIE:[1] BY GEAR

Item	Haul seines	Gill nets: "Bull", 3 to 3 1/16 inches	Gill nets: "Shoal", 2¼ to 3⅞ inches	Gill nets: "Shoal", 4 to 6 inches	Gill nets: "Shoal", 10 to 14 inches	Trammel nets
	Number	*Number*	*Number*	*Number*	*Number*	*Number*
Fishermen:						
On vessels		56	268	215		
On boats and shore:						
Regular	251		36	33	2	14
Casual	247		31	10	2	9
Total	498	56	335	258	4	23
Vessels:						
Steam		2	21	19		
Net tonnage		38	563	469		
Motor		9	31	22		
Net tonnage		64	298	194		
Total vessels		11	52	41		
Total net tonnage		102	861	663		
Boats:						
Motor	68		35	16	3	11
Other	173		13	15		2
Apparatus:						
Number	197	584	11,945	6,685	60	222
Length, yards	89,323					
Square yards		233,600	1,856,075	1,412,759	10,170	9,324

Item	Lines: Hand	Lines: Trot	Pound nets	Trap nets	Fyke nets	Total, exclusive of duplication
	Number	*Number*	*Number*	*Number*	*Number*	*Number*
Fishermen:						
On vessels						293
On boats and shore:						
Regular		8	26	513	121	823
Casual	1	44		14	24	363
Total	1	52	26	527	145	1,479
Vessels:						
Steam						24
Net tonnage						647
Motor						33
Net tonnage						314
Total vessels						57
Total net tonnage						961
Boats:						
Motor		1	8	178	43	305
Other	1	44	11	177	45	422
Apparatus:						
Number	1	45	63	4,073	1,114	
Hooks	2	9,990				

[1] Includes Niagara River above the Falls.

Lake fisheries of the United States, 1932—Continued

OPERATING UNITS OF LAKE HURON: BY GEAR

Item	Haul seines	Gill nets: "Shoal", 2¼ to 3⅞ inches	Gill nets: "Shoal", 4 to 6 inches	Lines: Troll	Lines: Trot
	Number	*Number*	*Number*	*Number*	*Number*
Fishermen:					
On vessels		69	149		80
On boats and shore:					
Regular	110	144	160		62
Casual	59	62	67	5	14
Total	169	275	376	5	156
Vessels:					
Steam		6	12		7
Net tonnage		135	235		154
Motor		9	25		8
Net tonnage		131	305		171
Total vessels		15	37		15
Total net tonnage		266	540		325
Boats:					
Motor	212	76	88	1	31
Other	17	30	26	4	5
Apparatus:					
Number	69	1,793	6,311	5	95
Length, yards	30,004				
Square yards		572,563	2,260,612		
Hooks				10	147,700

Item	Pound nets	Trap nets	Fyke nets	Total, exclusive of duplication
	Number	*Number*	*Number*	*Number*
Fishermen:				
On vessels	27	75		246
On boats and shore:				
Regular	258	472	52	756
Casual	16	75	17	226
Total	301	622	69	1,228
Vessels:				
Steam	1	1		16
Net tonnage	5	9		319
Motor	8	26		50
Net tonnage	52	223		541
Total vessels	9	27		66
Total net tonnage	57	232		860
Boats:				
Motor	95	188	21	341
Other	25	59	13	115
Apparatus:				
Number	747	2,636	398	

Lake fisheries of the United States, 1932—Continued

OPERATING UNITS OF LAKE MICHIGAN:[1] BY GEAR

Item	Haul seines	Gill nets: "Shoal", 2¼ to 3⅛ inches	Gill nets: "Shoal", 4 to 6 inches	Gill nets: "Shoal", 6 to 10 inches	Trammel nets	Lines: Troll	Lines: Trot
	Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Fishermen:							
On vessels	12	555	966	5	--------	--------	252
On boats and shore:							
Regular	75	264	480	14	--------	--------	38
Casual	31	208	363	4	6	7	51
Total	118	1,027	1,809	23	6	7	341
Vessels:							
Steam	--------	29	50	--------	--------	--------	22
Net tonnage	--------	591	987	--------	--------	--------	480
Motor	5	154	255	2	--------	--------	51
Net tonnage	37	1,782	2,695	13	--------	--------	594
Total vessels	5	183	305	2	--------	--------	73
Total net tonnage	37	2,373	3,682	13	--------	--------	1,074
Boats:							
Motor	8	162	238	8	--------	7	32
Other	43	74	74	2	4	--------	29
Apparatus:							
Number	53	16,996	42,090	414	4	7	687
Length, yards	17,479	--------	--------	--------	--------	--------	--------
Square yards	--------	4,174,411	11,563,102	54,449	413	--------	--------
Hooks	--------	--------	--------	--------	--------	7	380,000

Item	Pound nets	Trap nets	Fyke nets	Crawfish pots	Crowfoot bars	Picks	By hand	Total, exclusive of duplication
	Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Fishermen:								
On vessels	92	59	56	2	--------	--------	--------	1,029
On boats and shore:								
Regular	425	142	128	7	--------	1	--------	834
Casual	16	4	32	16	285	125	142	1,064
Total	533	205	216	25	285	126	142	2,927
Vessels:								
Steam	--------	2	--------	--------	--------	--------	--------	59
Net tonnage	--------	42	--------	--------	--------	--------	--------	1,244
Motor	36	15	23	1	--------	--------	--------	271
Net tonnage	262	167	172	7	--------	--------	--------	2,892
Total vessels	36	17	23	1	--------	--------	--------	330
Total net tonnage	262	209	172	7	--------	--------	--------	4,136
Boats:								
Motor	171	54	62	--------	135	--------	--------	569
Other	129	31	39	23	151	89	49	580
Apparatus:								
Number	814	441	791	2,910	360	126	--------	--------

[1] Includes operating units used in the mussel fisheries of streams tributary to Lakes Michigan, Huron, and Erie. Those used in Lakes Erie and Huron are included herein to avoid disclosure of private enterprise.

Lake fisheries of the United States, 1932—Continued

OPERATING UNITS OF LAKE SUPERIOR: BY GEAR

Item	Haul seines	Gill nets: "Shoal", 2¼ to 3⅞ inches	Gill nets: "Shoal", 4 to 6 inches	Lines: Hand	Lines: Troll	Lines: Trot	Pound nets	Trap nets	Fyke nets	Total, exclusive of duplication
	No.	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*
Fishermen:										
On vessels	------	82	99	8	------	70	26	2	5	135
On boats and shore:										
Regular	6	435	443	------	4	243	52	39	10	478
Casual	12	407	414	------	3	79	10	------	4	459
Total	18	924	956	3	7	392	88	41	19	1,067
Vessels:										
Steam	------	3	7	------	------	4	------	------	------	------
Net tonnage	------	71	154	------	------	86	------	------	------	154
Motor	------	26	23	1	------	17	9	1	2	37
Net tonnage	------	213	187	7	------	119	86	9	11	296
Total vessels	------	29	30	1	------	21	9	1	2	44
Total net tonnage	------	284	341	7	------	205	86	9	11	450
Boats:										
Motor	3	247	254	------	7	131	26	18	7	285
Other	7	348	348	------	------	58	3	------	1	359
Apparatus:										
Number	8	6,687	8,411	5	29	2,198	136	124	24	------
Length, yards	1,125	------	------	------	------	------	------	------	------	------
Square yards	------	2,062,662	3,124,189	------	------	------	------	------	------	------
Hooks	------	------	------	5	29	415,210	------	------	------	------

OPERATING UNITS OF LAKE OF THE WOODS, RAINY LAKE, AND NAMAKAN LAKE: BY GEAR

Item	Gill nets, "shoal", 4 to 6 inches	Pound nets	Fyke nets	Total, exclusive of duplication
	Number	*Number*	*Number*	*Number*
Fishermen, on boats and shore:				
Regular	57	44	38	95
Casual	1	------	------	1
Total	58	44	38	96
Boats: Motor	58	18	33	73
Apparatus:				
Number	249	73	116	------
Square yards	99,102	------	------	------

CATCH: BY GEAR

Species	New York: Haul seines, Pounds	Haul seines, Value	Gill nets, Pounds	Gill nets, Value	Trot lines, Pounds	Trot lines, Value	Fyke nets, Pounds	Fyke nets, Value
Blue pike	------	------	537,872	$25,814	------	------	1,045	$73
Burbot	------	------	16,183	606	102	$6	5,258	157
Carp	58,558	$2,839	14,753	741	------	------	1,084	38
Catfish and bullheads	3,046	138	996	86	------	------	24,898	1,850
Cisco	------	------	27,464	2,746	------	------	------	------
Eels	28	1	------	------	------	------	8,470	254
Lake herring	------	------	63,608	4,699	------	------	265	21
Lake trout	------	------	22,871	2,971	------	------	------	------
Pike or pickerel (jacks)	2,376	190	270	25	------	------	2,017	161
Rock bass	------	------	116	6	------	------	------	------
Sturgeon	------	------	3,670	751	21,659	4,556	------	------
Sucker "mullet"	50,499	2,496	24,934	784	------	------	12,344	396
Sunfish	------	------	------	------	------	------	2,178	65
White bass	------	------	2,840	113	------	------	------	------
Whitefish, common	------	------	210,941	37,692	------	------	40	6
Yellow perch	111	6	73,958	4,745	------	------	4,962	248
Yellow pike	------	------	10,963	1,249	------	------	------	------
Total	114,618	5,670	1,010,939	83,028	21,761	4,562	62,561	2,769

Lake fisheries of the United States, 1932—Continued

CATCH: BY GEAR—Continued

Species	New York—Continued				Pennsylvania			
	Trap nets		Total		Gill nets		Pound nets	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Blue pike	17,635	$1,249	556,052	$27,136	1,472,641	$66,269	101,225	$4,554
Burbot	1,215	13	22,758	782	1,588	16		
Carp	3,703	129	78,098	3,747	4,946	247	2,161	59
Catfish and bullheads	38,716	1,607	67,656	3,181			2,523	170
Cisco			27,464	2,746	81,387	8,138	1,449	145
Eels	35,038	1,051	43,536	1,306				
Lake herring	8,920	726	72,793	5,446				
Lake trout	4,104	482	26,975	3,453	1,046	125	5	1
Mooneye							500	5
Pike or pickerel (jacks)	10,190	826	14,853	1,202				
Rock bass	1,092	33	1,208	39				
Sheepshead							12,789	297
Sturgeon	2,592	518	27,921	5,825			607	101
Sucker "mullet"	20,690	653	108,467	4,329	5,780	114	6,344	127
Sunfish	5,906	191	8,084	256				
White bass			2,840	113	1,667	67	7,444	297
Whitefish, common	39,139	5,883	250,120	43,581	421,687	6,365	25,701	3,855
Yellow perch	23,265	1,557	102,296	6,556	248,259	11,171	77,542	4,291
Yellow pike	12,391	1,259	23,354	2,508	278	28	15,875	1,586
Total	224,596	16,177	1,434,475	112,206	2,239,279	92,540	254,165	15,488

Species	Pennsylvania—Continued				Ohio			
	Trap nets		Total		Haul seines		Gill nets	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Blue pike	33,059	$1,488	1,606,925	$72,311	2,541	$102	319,934	$12,797
Burbot	251	3	1,839	19	470	4	3,780	38
Carp	96	3	7,203	309	1,438,863	28,776	7,860	158
Catfish and bullheads	300	21	2,823	191	100,469	3,989	1,983	98
Cisco			82,836	8,283			48,259	5,791
Goldfish					34,708	348		
Lake trout			1,051	126				
Mooneye			500	5	12,383	123	87	1
Pike or pickerel (jacks)					1,355	106		
Sauger					16,962	678	738,093	29,523
Sheepshead	1,070	31	13,859	328	413,885	8,277	6,245	125
Sturgeon			607	101				
Sucker "mullet"	1,700	34	13,824	275	36,564	731	28,773	576
White bass	141	5	9,252	369	19,421	777	2,108	83
Whitefish, common			447,388	10,220	109	16	66,318	9,947
Yellow perch	3,875	232	329,676	15,694	8,952	321	3,115,265	109,057
Yellow pike	1,324	132	17,477	1,746	17,907	1,673	25,432	2,525
Total	41,816	1,949	2,535,260	109,977	2,104,589	45,921	4,364,137	170,719

Species	Ohio—Continued							
	Trammel nets		Pound nets		Trap nets		Fyke nets	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Blue pike					7,457,295	$298,575	4,717	$186
Burbot					241,738	2,422	108	
Carp	194,426	$3,888	6,525	$130	87,950	1,758	54,108	1,082
Catfish and bullheads	623	31	15,520	465	262,317	11,629	63,890	2,222
Cisco	25	3			1,631	196		
Goldfish	380	4	2,995	30	3,097	30	2,833	29
Mooneye			1,150	11	85	1	1,479	14
Sauger			405	16	2,213,507	87,338	119,916	4,796
Sheepshead	5,404	108			1,497,334	29,954	146,571	2,931
Sucker "mullet"	495	10	8,710	174	904,288	18,084	115,962	2,318
White bass			1,200	48	175,808	6,738	42,066	1,682
Whitefish, common					429,312	64,396	11,345	1,701
Yellow perch			460	16	5,950,056	215,004	164,325	5,601
Yellow pike			2,835	255	1,616,251	158,644	237,961	21,423
Total	201,353	4,044	39,800	1,145	20,840,669	894,769	965,281	43,986

Lake fisheries of the United States, 1932—Continued

CATCH: BY GEAR—Continued

Species	Ohio—Continued		Michigan					
	Total		Haul seines		Gill nets		Troll lines	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Blue pike	7,784,487	$311,660						
Burbot	246,096	2,465	114	$2	12,668	$128		
Carp	1,789,732	35,792	1,726,381	56,488	1,524	35		
Catfish and bullheads	444,802	18,434	32,396	2,535	166	7		
Chubs					940,044	67,914		
Cisco	49,915	5,990						
Goldfish	44,013	441	750	15				
Lake herring			23,901	478	636,780	12,354		
Lake trout					4,600,878	425,933	36,752	$3,124
Mooneye	15,184	150						
Pike or pickerel (jacks)	1,355	106	617	50	2,732	205		
Rock bass			1,944	94	95	3		
Sauger	3,088,883	122,351	1,525	71	30,738	1,366		
Sheepshead	2,069,439	41,395	10,250	308				
Smelt					22,004	660		
Sucker "mullet"	1,094,792	21,893	212,910	4,895	204,187	6,500		
White bass	240,603	9,328						
Whitefish:								
Common	507,084	76,060			2,123,734	226,839		
Menominee					127,999	12,591		
Yellow perch	9,239,058	329,999	23,256	1,611	214,494	13,736		
Yellow pike	1,900,386	184,520	48,006	5,806	194,738	23,418	863	104
Total	28,515,829	1,160,584	2,082,050	72,353	9,172,781	791,689	37,615	3,228

Species	Michigan—Continued							
	Trot lines		Pound nets		Trap nets		Fyke nets	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Bowfin			158	$3	2,657	$53	133	$3
Burbot	3,426	$45	152	2	1,071	21	2,144	43
Carp	1,006	50	29,726	703	155,370	4,564	227,432	10,366
Catfish and bullheads	1,761	141	1,426	85	87,337	6,537	135,329	10,713
Chubs	427	48	457	22	5,285	527	216	20
Goldfish					805	16	2,965	59
Lake herring			2,446,350	64,381	302,275	8,110	33,154	776
Lake trout	1,502,126	137,901	238,857	22,427	433,180	40,869	1,317	107
Pike or pickerel (jacks)			4,168	310	39,560	3,199	13,507	1,049
Rock bass	145	4	124	4	9,866	334	4,118	166
Sauger	10	1	7,795	446	69,720	3,197	33,010	1,624
Sheepshead	416	12	12,527	381	20,262	608	31,584	948
Sucker "mullet"	1,564	35	395,359	9,186	2,671,843	58,158	264,198	6,432
Whitefish:								
Common	418	42	2,091,424	214,811	3,557,225	422,550	15,060	1,508
Menominee	2,175	196	5,418	522	5,886	575	120	11
Yellow perch	12,825	864	35,089	2,385	589,903	39,385	130,757	7,974
Yellow pike	223	29	354,448	43,251	1,019,985	123,463	140,845	17,403
Total	1,526,522	139,308	5,623,478	358,919	8,972,230	712,166	1,035,889	59,202

Species	Michigan—Continued							
	Crowfoot bars		Picks		By hand		Total	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Bowfin							2,948	$59
Burbot							19,575	241
Carp							2,141,439	72,206
Catfish and bullheads							258,415	20,018
Chubs							946,429	68,531
Goldfish							4,520	90
Lake herring							3,442,460	86,099
Lake trout							6,813,110	630,361
Pike or pickerel (jacks)							60,584	4,813
Rock bass							16,292	605
Sauger							142,798	6,705
Sheepshead							75,039	2,257
Smelt							22,004	660
Sucker "mullet"							3,810,061	85,206
Whitefish:								
Common							7,787,861	865,750
Menominee							141,598	13,895
Yellow perch							1,006,324	65,955
Yellow pike							1,759,108	213,474
Mussel shells	1,315,500	$18,180	237,966	$3,279	125,518	$1,722	1,678,984	23,181
Pearls and slugs		877		283		294		1,454
Total	1,315,500	19,057	237,966	3,562	125,518	2,016	30,129,549	2,161,560

Lake fisheries of the United States, 1932—Continued

CATCH: BY GEAR—Continued

Species	Indiana									
	Gill nets		Pound nets		Crowfoot bars		By hand		Total	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Buffalofish	10	$1	1,900	$99					1,910	$100
Burbot	3,887	217	75	3					3,962	220
Carp			3,320	119					3,320	119
Chubs	184,698	16,473							184,698	16,473
Lake herring	94,795	4,146	28,255	930					123,050	5,076
Lake trout	98,266	8,289	125	18					98,391	8,307
Steelhead trout	4,100	650							4,100	650
Sucker "mullet"	825	41	1,205	44					2,030	85
Whitefish, common	3,000	325	6,210	533					9,210	858
Yellow perch	15,928	1,341	7,310	490					23,238	1,831
Yellow pike	3,000	450	3,430	343					6,430	793
Mussel shells					140,000	$1,820	30,000	$390	170,000	2,210
Pearls and slugs						140		30		170
Total	408,500	31,933	51,830	2,579	140,000	1,960	30,000	420	630,339	36,892

Species	Illinois							
	Gill nets		Trot lines		Pound nets		Total	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Carp					200	$4	200	$4
Chubs	466,365	$28,674			1,080	30	467,445	28,704
Lake herring	76,860	3,324			8,720	120	85,580	3,444
Lake trout	279,893	21,805	598	$60	114	12	280,605	21,877
Whitefish, common					3,240	360	3,240	360
Yellow perch	46,215	3,543			1,500	30	47,715	3,573
Total	869,333	57,346	598	60	14,854	556	884,785	57,962

Species	Wisconsin							
	Haul seines		Gill nets		Trammel nets		Trot lines	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Burbot	60	$1	26,114	$392			4,886	$73
Carp	217,871	4,902	7,826	189	3,660	$82		
Catfish and bullheads	3,825	268	4,248	297				
Chubs			2,404,753	132,568			306	17
Lake herring			1,343,486	12,141	15	1		
Lake trout			2,038,086	144,574			614,526	44,348
Pike or pickerel (jacks)	17	1	40,383	2,307			366	26
Smelt			40,643	1,422				
Sucker "mullet"	11,228	281	598,178	14,472	517	13		
Whitefish:								
Common	4,297	481	247,647	26,836				
Menominee			70,584	2,447				
Yellow perch	61	4	101,043	6,162			535	33
Yellow pike			914	128				
Total	237,359	5,938	6,923,905	343,935	4,192	96	620,619	44,497

Species	Wisconsin—Continued							
	Pound nets		Trap nets		Fyke nets		Crawfish pots	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Burbot	1,965	$30	211	$3	3,605	$54		
Carp	1,674	38			25,676	578		
Catfish and bullheads	775	54			41,408	2,909		
Chubs	12,536	684	12,475	745				
Lake herring	1,484,164	14,695	312	2	11,079	102		
Lake trout	255,092	19,173	255	16	1,154	74		
Pike or pickerel (jacks)	21,603	1,541	2,413	141	11,396	774		
Sheepshead			11	1	156	5		
Smelt	20,666	723			14,494	508		
Steelhead trout	950	124						
Sucker "mullet"	178,793	3,019	2,569	23	251,030	6,190		
Whitefish:								
Common	295,547	8,917	734	47	514	33		
Menominee	18,453	770			71	2		
Yellow perch	52,303	3,189			528,621	32,245		
Yellow pike	639	90			1,812	254		
Crawfish							19,677	$984
Total	2,345,160	53,047	18,980	978	891,016	43,728	19,677	984

Lake fisheries of the United States, 1932—Continued

CATCH: BY GEAR—Continued

Species	Wisconsin—Continued							
	Crowfoot bars		Picks		By hand		Total	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Burbot							36,841	$553
Carp							256,707	5,789
Catfish and bullheads							50,256	3,528
Chubs							2,430,070	134,014
Lake herring							2,839,056	26,941
Lake trout							2,909,113	208,185
Pike or pickerel (jacks)							76,178	4,790
Sheepshead							167	6
Smelt							75,803	2,653
Steelhead trout							950	124
Sucker "mullet"							1,042,315	23,998
Whitefish:								
Common							548,739	36,314
Menominee							89,108	3,219
Yellow perch							682,563	41,633
Yellow pike							3,365	472
Crawfish							19,677	984
Mussel shells	12,930	$54	9,000	$85	24,000	$100	45,930	239
Total	12,930	54	9,000	85	24,000	100	11,106,838	493,442

Species	Minnesota					
	Gill nets		Trot lines		Pound nets	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Carp					6,526	$125
Chubs	25,083	$495			2,787	55
Crappie	51	10				
Lake herring	5,123,435	54,251				
Lake trout	431,413	32,559	100,366	$14,642	688	81
Pike or pickerel (jacks)	166,581	4,104			26,502	654
Sauger	107,949	3,082			107,949	3,081
Sturgeon					1,384	355
Sucker "mullet"	48,259	586			48,483	590
Tullibee	648,234	8,050			324,217	4,027
Whitefish:						
Common	109,879	6,952			51,415	3,329
Menominee	1,968	89				
Yellow perch	31,784	1,280			374	22
Yellow pike	362,902	26,523			308,363	22,888
Total	7,057,538	137,981	100,366	14,642	878,688	35,207

Species	Minnesota—Continued			
	Fyke nets		Total	
	Pounds	*Value*	*Pounds*	*Value*
Burbot	45	$1	45	$1
Carp	344	7	6,870	132
Catfish and bullheads	9,412	455	9,412	455
Chubs			27,870	550
Crappie	967	183	1,018	193
Lake herring			5,123,435	54,251
Lake trout			532,467	47,282
Pike or pickerel (jacks)	26,503	655	219,586	5,413
Sauger			215,898	6,163
Sturgeon			1,384	355
Sucker "mullet"	24,129	204	120,871	1,470
Tullibee	324,217	4,027	1,296,668	16,104
Whitefish:				
Common	15,568	933	176,862	11,214
Menominee			1,968	89
Yellow perch	9,472	359	41,630	1,661
Yellow pike	60,065	4,409	731,330	53,820
Total	470,722	11,323	8,507,314	199,153

Lake fisheries of the United States, 1932—Continued

CATCH: BY LAKES

Species	Lake Ontario		Lake Erie					
	New York		New York		Pennsylvania		Ohio	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Blue pike	80,785	$5,080	475,267	$22,056	1,606,925	$72,311	7,784,487	$311,660
Burbot	20,343	757	2,415	25	1,839	19	246,096	2,465
Carp	54,457	2,531	23,641	1,216	7,203	309	1,789,732	35,792
Catfish and bullheads	66,137	3,064	1,519	117	2,823	191	444,802	18,434
Cisco			27,404	2,746	82,836	8,283	49,915	5,990
Eels	43,536	1,306						
Goldfish							44,013	441
Lake herring	72,793	5,446						
Lake trout	18,286	2,410	8,689	1,043	1,051	126		
Mooneye					500	5	15,184	150
Pike or pickerel (jacks)	14,853	1,202					1,355	106
Rock bass	1,092	33	116	6				
Sauger							3,088,883	122,351
Sheepshead					13,859	328	2,069,439	41,395
Sturgeon	11,627	2,556	16,294	3,269	607	101		
Sucker "mullet"	35,585	1,182	72,882	3,147	13,824	275	1,094,792	21,893
Sunfish	8,084	256						
White bass			2,840	113	9,252	369	240,603	9,328
Whitefish, common	54,635	8,416	195,485	35,165	447,388	10,220	507,084	76,060
Yellow perch	27,044	1,648	75,252	4,908	329,676	15,694	9,239,058	329,999
Yellow pike	12,022	1,213	11,332	1,295	17,477	1,746	1,900,386	184,520
Total	521,279	37,100	913,196	75,106	2,535,260	109,977	28,515,829	1,160,584

Species	Lake Erie—Continued				Lake Huron		Lake Michigan	
	Michigan		Total		Michigan		Michigan	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Blue pike			9,866,679	$406,027				
Bowfin	184	$4	184	4	2,764	$55		
Burbot	1,171	24	251,521	2,533	692	14	15,133	$152
Carp	1,057,554	52,877	2,878,130	90,194	1,055,068	18,404	28,755	803
Catfish and bullheads	173,149	13,852	622,293	32,594	80,166	6,012	5,100	154
Chubs					507,121	50,717	334,333	8,358
Cisco			160,215	17,019				
Goldfish	4,520	90	48,533	531				
Lake herring					2,646,662	71,460	255,563	3,834
Lake trout			9,740	1,169	2,220,624	207,597	2,767,914	276,790
Mooneye			15,684	155				
Pike or pickerel (jacks)	6,248	500	7,603	606	33,194	2,756	15,357	1,152
Rock bass	5,774	289	5,890	295	8,455	254	2,003	62
Sauger	53,330	2,667	3,142,213	125,018	67,878	2,715	16,015	961
Sheepshead	61,025	1,831	2,144,323	43,554	1,925	63	12,089	363
Smelt							22,004	660
Sturgeon			16,901	3,370				
Sucker "mullet"	143,755	4,313	1,325,253	29,628	2,592,791	54,457	992,939	24,824
White bass			252,695	9,810				
Whitefish:								
Common	18,613	1,861	1,168,570	123,306	4,332,874	487,802	3,053,548	335,890
Menominee					30,006	2,880	97,236	9,723
Yellow perch	89,215	4,461	9,733,201	355,062	700,094	48,306	200,381	12,023
Yellow pike	90,862	10,903	2,020,057	198,464	1,568,044	189,543	95,312	12,391
Mussels shells [3]							1,678,984	23,181
Pearls and slugs [3]								1,454
Total	1,705,400	93,672	33,669,685	1,439,339	15,848,358	1,143,095	9,592,726	712,835

[3] From streams tributary to Lakes Michigan, Huron, and Erie. The mussel shells taken in streams tributary to Lakes Huron and Erie, which were inconsiderable, have been included with those taken in Lake Michigan, State of Michigan, to avoid disclosure of private enterprise.

Lake fisheries of the United States, 1932—Continued

CATCH: BY LAKES—Continued

Species	Lake Michigan—Continued							
	Indiana		Illinois		Wisconsin		Total	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Buffalofish	1,910	$100					1,910	$100
Burbot	3,962	220			36,059	$541	55,154	913
Carp	3,320	119	200	$4	251,620	5,662	283,895	6,648
Catfish and bullheads					50,256	3,528	55,356	3,682
Chubs	184,698	16,473	467,445	28,704	2,142,632	117,835	3,129,108	171,370
Lake herring	123,050	5,076	85,580	3,444	2,476,891	24,770	2,941,084	37,124
Lake trout	98,391	8,307	280,605	21,877	2,344,870	172,074	5,491,780	479,048
Pike or pickerel (jacks)					18,030	1,261	33,387	2,413
Rock bass							2,063	62
Sauger							16,015	961
Sheepshead					156	5	12,245	368
Smelt					75,803	2,653	97,807	3,313
Steelhead trout	4,100	650			950	124	5,050	774
Sucker "mullet"	2,030	85			914,433	22,861	1,909,402	47,770
Whitefish:								
Common	9,210	858	3,240	360	401,606	32,658	3,557,604	369,766
Menominee					29,951	1,326	127,187	11,049
Yellow perch	23,238	1,831	47,715	3,573	682,275	41,620	953,609	59,047
Yellow pike	6,430	793			3,365	472	105,107	13,656
Crawfish					19,677	984	19,677	984
Mussel shells [3]	170,000	2,210			45,930	239	1,894,914	25,630
Pearls and slugs [3]		170						1,624
Total	630,339	36,892	884,785	57,962	9,584,504	428,613	20,092,354	1,236,302

Species	Lake Superior					
	Michigan		Wisconsin		Minnesota	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Burbot	2,579	$51	782	$12		
Carp	62	2	5,087	127		
Chubs	104,975	9,456	287,438	16,179		
Lake herring	540,235	10,805	362,165	2,171	5,123,435	$54,251
Lake trout	1,824,572	145,974	564,243	36,111	531,779	47,201
Pike or pickerel (jacks)	5,785	405	58,148	3,529		
Sauger	5,575	362				
Sheepshead			11	1		
Sucker "mullet"	80,576	1,612	127,882	1,137		
Whitefish:						
Common	382,826	40,197	57,133	3,656	10,610	936
Menominee	14,356	1,292	59,157	1,893	1,968	89
Yellow perch	16,634	1,165	288	13		
Yellow pike	4,890	637				
Total	2,983,065	211,958	1,522,334	64,829	5,667,792	102,477

[3] From streams tributary to Lakes Michigan, Huron, and Erie. The mussel shells taken in streams tributary to Lakes Huron and Erie, which were inconsiderable, have been included with those taken in Lake Michigan, State of Michigan, to avoid disclosure of private enterprise.

Lake fisheries of the United States, 1932—Continued

CATCH: BY LAKES—Continued

Species	Lake Superior—Con.		Lake of the Woods, Rainy Lake, and Namakan Lake		Total, all lakes	
	Total		Minnesota			
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Blue pike					9,947,464	$411,107
Bowfin					2,048	59
Buffalofish					1,910	100
Burbot	3,361	$63	45	$1	331,116	4,281
Carp	5,149	129	6,870	132	4,283,569	118,008
Catfish and bullheads			9,412	455	833,364	45,807
Chubs	392,413	25,635	27,870	550	4,056,512	248,272
Cisco					160,215	17,019
Crappie			1,018	193	1,018	193
Eels					43,536	1,306
Goldfish					48,533	531
Lake herring	6,025,835	67,227			11,686,374	181,257
Lake trout	2,920,594	229,286	688	81	10,661,712	919,591
Mooneye					15,684	155
Pike or pickerel (jacks)	63,933	3,934	219,586	5,413	372,556	16,324
Rock bass					17,500	644
Sauger	5,575	302	215,808	6,163	3,447,579	135,219
Sheepshead	11	1			2,158,504	43,986
Smelt					97,807	3,313
Steelhead trout					5,050	774
Sturgeon			1,384	355	29,912	6,281
Sucker "mullet"	208,458	2,740	120,871	1,470	6,192,360	137,256
Sunfish					8,084	256
Tullibees			1,296,668	16,104	1,296,668	16,104
White bass					252,695	9,810
Whitefish:						
Common	450,569	44,789	166,252	10,278	9,730,504	1,044,357
Menominee	75,481	3,274			232,674	17,203
Yellow perch	16,922	1,178	41,630	1,661	11,472,500	466,902
Yellow pike	4,890	637	731,330	53,820	4,441,450	457,333
Crawfish					19,677	984
Mussel shells [3]					1,894,914	25,630
Pearls and slugs [3]						1,624
Total	10,173,191	379,264	2,839,522	96,676	83,744,389	4,331,776

[3] From streams tributary to Lakes Michigan, Huron, and Erie. The mussel shells taken in streams tributary to Lakes Huron and Erie, which were inconsiderable, have been included with those taken in Lake Michigan, State of Michigan, to avoid disclosure of private enterprise.

FISHERIES OF THE MISSISSIPPI RIVER AND TRIBUTARIES

The most recent complete catch statistics of the fisheries of the Mississippi River and tributaries are those collected for the year 1931, a summary of which follows:

The yield of fishery products in that year amounted to 82,382,523 pounds, valued at $2,897,357, which was a decrease of 22 percent in the catch and 36 percent in its value as compared with the catch and its value in 1922 when the most recent preceding survey was made. Detailed statistics of the fisheries of the Mississippi River and tributaries appear in "Fishery Industries of the United States, 1932" by R. H. Fiedler, Appendix III to Report of Commissioner of Fisheries for the fiscal year 1933.

Following the summary of the fisheries of the Mississippi River and tributaries for 1931 are statistics of the fisheries of Lakes Pepin and Keokuk and the Mississippi River between these two lakes for 1932.

Catch of the fisheries of the Mississippi River and tributaries, 1931

Species	Pounds	Value	Species	Pounds	Value
FISH			SHELLFISH, ETC.		
Black bass	14,000	$1,680	Crawfish	29,248	$292
Bowfin	428,316	9,290	Shrimp	48,503	3,923
Buffalofish	15,772,451	687,288	Mussel shells	37,254,697	421,611
Carp	11,891,761	455,399	Pearls		11,436
Catfish and bullheads	10,266,847	877,798	Slugs		68,216
Crappie	41,141	2,959	Frogs	874,901	130,882
Eels	6,978	441	Terrapin	19,170	391
Garfish	72,450	791	Turtles:		
Minnows	525	209	Snapper	75,190	3,008
Mooneye	3,090	153	Soft-shell	19,100	394
Paddlefish or spoonbill cat	951,452	43,134			
Pike or pickerel	4,700	470	Total	38,320,809	640,153
Quillback or "American carp"	268,438	11,286			
Sauger	2,365	451	Grand total	82,382,523	2,897,357
Sheepshead	3,904,844	142,938			
Sturgeon, shovelnose	87,426	8,163			
Sucker "mullet"	314,835	12,682			
Sunfish	21,850	1,094			
Whitebass	3,300	198			
Yellow pike	4,945	771			
Total	44,061,714	2,257,204			

LAKE PEPIN

Fisheries of Lake Pepin, 1932

OPERATING UNITS: BY GEAR

Item	Haul seines	Gill nets	Pound nets	Fyke nets	Spears	Total, exclusive of duplication
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Regular	2		5	10		13
Casual	40	10	5	20	7	42
Total	42	10	10	30	7	55
Boats:						
Motor	16	8	8	18	4	24
Other	16			11	3	20
Apparatus:						
Number	39	8	30	277	7	
Length, yards	7,501					
Square yards		533				

CATCH: BY GEAR

Species	Haul seines		Gill nets		Pound nets		Fyke nets		Spears		Total	
	Lb.	*Value*	*Lb.*	*Value*	*Lb.*	*Value*	*Lb.*	*Value*	*Lb.*	*Value*	*Lb.*	*Value*
Bowfin	2,600	$78					350	$10			2,950	$88
Buffalofish	5,350	214	3,000	$120	8,000	$320	6,900	276	300	$12	23,550	942
Carp	293,300	8,799	10,000	300	26,000	780	117,300	3,519	5,300	159	451,900	13,557
Catfish and bullheads	3,800	373			13,000	1,300	11,500	1,132			28,300	2,805
Sheepshead	10,600	394	2,000	80	10,000	400	4,400	176	700	28	27,700	1,078
Sucker "mullet"	80,000	1,600	1,000	20	10,000	200	2,750	55			93,750	1,875
Turtles	2,350	47									2,350	47
Total	398,000	11,505	16,000	520	67,000	3,000	143,200	5,168	6,300	199	630,500	20,392

Fisheries of Lake Pepin, 1932—Continued

OPERATING UNITS: BY STATES

Item	Minnesota	Wisconsin	Total
	Number	*Number*	*Number*
Fishermen:			
Regular		13	13
Casual	6	36	42
Total	6	49	55
Boats:			
Motor	2	22	24
Other	2	18	20
Apparatus:			
Haul seines	2	37	39
Length, yards	500	7,001	7,501
Gill nets		8	8
Square yards		533	533
Pound nets		30	30
Fyke nets		277	277
Spears	1	6	7

CATCH: BY STATES

Species	Minnesota		Wisconsin		Total	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Bowfin			2,950	$88	2,950	$88
Buffalofish	200	$8	23,350	934	23,550	942
Carp	23,300	699	428,600	12,858	451,900	13,557
Catfish and bullheads	500	50	27,800	2,755	28,300	2,805
Sheepshead	1,700	38	26,000	1,040	27,700	1,078
Sucker "mullet"	2,000	40	91,750	1,835	93,750	1,875
Turtles			2,350	47	2,350	47
Total	27,700	835	602,800	19,557	630,500	20,392

LAKE KEOKUK

Fisheries of Lake Keokuk, 1932

OPERATING UNITS: BY GEAR

Item	Haul seines	Lines	Fyke nets	Total, exclusive of duplication
	Number	*Number*	*Number*	*Number*
Fishermen:				
Regular	9		21	21
Casual	27	10	49	53
Total	36	10	70	74
Boats:				
Motor	15	4	29	32
Other	15	8	33	39
Apparatus:				
Number	16	22	522	
Length, yards	4,666			
Hooks		4,600		

CATCH: BY GEAR

Species	Haul seines		Lines		Fyke nets		Total	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Bowfin	3,125	$69					3,125	$69
Buffalofish	12,500	500			70,000	$2,800	82,500	3,300
Carp	125,000	3,750	1,500	$45	83,250	2,527	209,750	6,322
Catfish and bullheads	4,500	450	2,200	220	80,850	8,085	87,550	8,755
Paddlefish or spoonbill cat	1,300	130					1,300	130
Pike or pickerel	300	15					300	15
Sheepshead	38,000	1,080	1,250	50	52,500	1,432	91,750	2,562
Sturgeon, shovelnose	1,100	92					1,100	92
Sucker "mullet"	7,000	140			3,125	62	10,125	202
Turtles	1,000	20			800	16	1,800	36
Total	193,825	6,246	4,950	315	290,525	14,922	489,300	21,483

Fisheries of Lake Keokuk, 1932—Continued

OPERATING UNITS: BY STATES

Items	Illinois	Iowa	Total
	Number	*Number*	*Number*
Fishermen:			
Regular	6	15	21
Casual	20	33	53
Total	26	48	74
Boats:			
Motor	11	21	32
Other	13	26	39
Apparatus:			
Haul seines	5	11	16
Length, yards	833	3,833	4,666
Lines	22		22
Hooks	4,600		4,600
Fyke nets	227	295	522

CATCH: BY STATES

Species	Illinois		Iowa		Total	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Bowfin			3,125	$69	3,125	$69
Buffalofish	13,000	$520	69,500	2,780	82,500	3,300
Carp	68,000	2,040	141,750	4,282	209,750	6,322
Catfish and bullheads	39,800	3,980	47,750	4,775	87,550	8,755
Paddlefish or spoonbill cat			1,300	130	1,300	130
Pike or pickerel			300	15	300	15
Sheepshead	19,500	800	72,250	1,762	91,750	2,562
Sturgeon, shovelnose			1,100	92	1,100	92
Sucker "mullet"	1,500	30	8,625	172	10,125	202
Turtles	800	16	1,000	20	1,800	36
Total	142,600	7,386	346,700	14,097	489,300	21,483

MISSISSIPPI RIVER BETWEEN LAKE PEPIN AND LAKE KEOKUK

Fisheries of the Mississippi River between Lake Pepin and Lake Keokuk, 1932

OPERATING UNITS: BY GEAR

Item	Haul seines	Gill nets	Lines	Dip nets	Fyke nets	Pound nets	Total, exclusive of duplication
	Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Fishermen:							
Regular	99		1		214	6	229
Casual	328	2	164	40	450	6	563
Total	427	2	165	40	664	12	792
Boats:							
Motor	151	1	65		312	6	336
Other	153	1	103	10	309	6	396
Apparatus:							
Number	209	1	167	40	6,973	31	
Length, yards	43,667						
Square yards		250					
Hooks			19,275				

Fisheries of the Mississippi River between Lake Pepin and Lake Keokuk, 1932—Continued

CATCH: BY GEAR

Species	Haul seines		Gill nets		Lines		Dip nets	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Bowfin	166,900	$4,974						
Buffalofish	329,300	13,176	3,000	$120			15,500	$620
Carp	1,316,200	39,126	1,000	30	30,200	$906	17,000	510
Catfish and bullheads	33,400	3,340	500	50	32,700	3,090	500	50
Gizzard shad	1,800	36						
Mooneye	3,500	90						
Paddlefish or spoonbill cat	3,600	390					1,700	170
Pike or pickerel	11,600	1,120						
Sheepshead	376,900	15,085	3,000	120	17,250	679	24,000	960
Sturgeon, shovelnose	20,750	2,075			4,400	440	7,200	720
Sucker "mullet"	140,600	2,812	700	14			5,000	100
Turtles:								
Snapper	12,350	271						
Soft-shell	2,600	52						
Total	2,419,500	82,547	8,200	334	84,550	5,115	70,900	3,130

Species	Fyke nets		Pound nets		Total	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Bowfin	500	$10	7,000	$210	174,400	$5,194
Buffalofish	784,450	31,269	17,500	700	1,149,750	45,885
Carp	942,500	28,255	66,000	1,980	2,372,900	70,807
Catfish and bullheads	577,950	57,555	1,700	170	646,750	64,255
Eels	1,000	80			1,000	80
Gizzrd shad					1,800	36
Mooneye					3,500	90
Paddlefish or spoonbill cat					5,300	560
Pike or pickerel			500	50	12,100	1,170
Sheepshead	298,800	11,702	11,000	440	730,950	28,986
Sturgeon, shovelnose	8,025	802	750	75	41,125	4,112
Sucker "mullet"	46,400	928	7,000	140	199,700	3,994
Turtles:						
Snapper	700	14			13,050	285
Soft-shell					2,600	52
Total	2,660,325	130,615	111,450	3,765	5,354,925	225,506

OPERATING UNITS: BY STATES

Item	Illinois	Iowa	Minnesota	Wisconsin	Total
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*
Regular	39	113	12	65	229
Casual	159	215	53	136	563
Total	198	328	65	201	792
Boats:					
Motor	74	144	31	87	336
Other	108	153	43	92	396
Apparatus:					
Haul seines	42	83	21	63	209
Length, yards	6,998	18,168	4,667	13,834	43,667
Gill nets				1	1
Square yards				250	250
Lines	49	57	34	27	167
Hooks	6,400	8,900	3,400	575	19,275
Dip nets		40			40
Fyke nets	1,470	3,178	485	1,840	6,973
Pound nets		31			31

Fisheries of the Mississippi River between Lake Pepin and Lake Keokuk, 1932—Continued

CATCH: BY STATES

Species	Illinois		Iowa		Minnesota	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Bowfin	700	$14	78,450	$2,328	4,250	$127
Buffalofish	183,100	7,324	519,300	20,747	52,700	2,108
Carp	456,500	13,695	913,700	27,391	216,800	6,144
Catfish and bullheads	148,700	14,870	339,300	33,750	38,100	3,570
Eels			1,000	80		
Gizzard shad						
Mooneye			3,500	90		
Paddlefish or spoonbill cat	500	50	4,300	460		
Pike or pickerel			12,100	1,170		
Sheepshead	139,500	5,580	247,200	9,636	67,050	2,682
Sturgeon, shovelnose	2,400	240	36,225	3,622	1,100	110
Sucker "mullet"	7,000	140	51,700	1,034	47,600	952
Turtles:						
Snapper	500	10	7,400	172	1,300	26
Soft-shell			350	7		
Total	938,900	41,923	2,214,525	100,487	428,900	15,719

Species	Wisconsin		Total	
	Pounds	*Value*	*Pounds*	*Value*
Bowfin	91,000	$2,725	174,400	$5,194
Buffalofish	394,650	15,706	1,149,750	45,885
Carp	785,900	23,577	2,372,900	70,807
Catfish and bullheads	120,650	12,065	646,750	64,255
Eels			1,000	80
Gizzard shad	1,800	36	1,800	36
Mooneye			3,500	90
Paddlefish or spoonbill cat	500	50	5,300	560
Pike or pickerel			12,100	1,170
Sheepshead	277,200	11,088	730,950	28,986
Sturgeon, shovelnose	1,400	140	41,125	4,112
Sucker "mullet"	93,400	1,868	199,700	3,994
Turtles:				
Snapper	3,850	77	13,050	285
Soft-shell	2,250	45	2,600	52
Total	1,772,600	67,377	5,354,925	225,506

FISHERIES OF ALASKA[12]

The catch of fishery products in Alaska during 1932 amounted to 598,855,651 pounds, valued at $6,971,324 which is an increase of less than one-half of one percent in volume but a decrease of 31 percent in value as compared with the previous year. Of the total catch in 1932, 452,536,052 pounds, valued at $5,765,501, consisted of salmon; 143,406,896 pounds, valued at $1,048,045, other fish; and 2,912,703 pounds, valued at $157,778, shellfish. In addition 270 whales were taken. These fisheries gave employment to 8,059 fishermen, 1,261 persons on transporting vessels, and 10,802 persons in the wholesale and manufacturing industries—a total of 20,122 persons which is a decrease of 11 percent as compared with the number employed during 1931.

[12] Statistics for the fisheries of Alaska are collected and compiled by the Alaska Division of this Bureau A summary of these statistics appears in this section. For detailed figures the reader is referred to "Alaska Fisheries and Fur-Seal Industries in 1932" by Ward T. Bower, App. I to the Report of Commissioner of Fisheries for the fiscal year 1933.

Fisheries of Alaska, 1932

SUMMARY: BY DISTRICTS

Item	Southeast Alaska		Central Alaska		Western Alaska		Total	
	Number	*Value*	*Number*	*Value*	*Number*	*Value*	*Number*	*Value*
PERSONS ENGAGED								
In fishing	3,097		2,210		2,752		8,059	
In transporting	408		478		375		1,261	
In wholesale and manufacturing industries	4,010		3,037		3,755		10,802	
Total	7,515		5,725		6,882		20,122	
CRAFT EMPLOYED								
Vessels fishing	390		48		8		446	
Boats fishing	1,558		1,267		1,313		4,138	
Vessels transporting	98		120		77		295	
Scows, houseboats, pile drivers, etc	206		232		161		599	
Total	2,252		1,667		1,559		5,478	
CATCH	*Pounds*		*Pounds*		*Pounds*		*Pounds*	
Fish:								
Salmon	174,728,919	$2,041,040	132,993,478	$1,728,252	144,813,655	$1,996,209	452,536,052	$5,765,501
Other	105,180,340	854,196	34,470,645	174,984	3,755,911	18,865	143,406,896	1,048,045
Shellfish	774,135	38,894	2,138,568	118,884			2,912,703	157,778
Total	280,683,394	2,934,130	169,602,691	2,022,120	148,569,566	2,015,074	598,855,651	6,971,324
	Number		*Number*		*Number*		*Number*	
Whales			270				270	
WHOLESALE AND MANUFACTURING								
Establishments	77		80		44		201	
PRODUCTS AS PREPARED FOR MARKET	*Pounds*		*Pounds*		*Pounds*		*Pounds*	
Salmon	118,282,518	8,004,080	78,606,428	6,777,459	70,987,135	7,828,272	267,876,081	22,609,811
Herring	38,906,732	563,600	16,615,555	499,297	2,338,620	110,261	57,860,907	1,173,158
Halibut	13,530,363	491,547	21,933	1,505			13,552,296	493,052
Cod			114,213	3,552	83,050	2,031	197,263	5,583
Trout	2,664	178	9,682	764			12,346	942
Sablefish	86,719	2,378					86,719	2,378
Smelt			5,100	357			5,100	357
Rockfish	2,762	48					2,762	48
Clam	240	130	878,388	447,238			878,628	447,368
Shrimp	299,586	113,851	2,200	285			301,786	114,136
Crab	124,198	32,197	194,721	58,757			318,919	90,954
Whale			7,664,143	91,133			7,664,143	91,133
Total	171,235,782	9,208,009	104,112,363	7,880,347	73,408,805	7,940,564	348,756,950	25,028,920

OPERATING UNITS: BY DISTRICTS

Item	Southeast Alaska	Central Alaska	Western Alaska	Total
	Number	*Number*	*Number*	*Number*
Fishermen	3,097	2,210	2,752	8,059
Vessels fishing:				
Steam		4		4
Net tonnage		276		276
Motor	390	44	8	442
Net tonnage	5,129	765	194	6,088
Boats fishing:				
Motor	702	336	45	1,083
Other	856	931	1,268	3,055
Apparatus:				
Traps	193	149	1	343
Purse seines	223	66	3	292
Yards	78,974	15,234	1,350	95,558
Haul seines	4	85	1	90
Yards	800	20,990	200	21,990

Item	Southeast Alaska	Central Alaska	Western Alaska	Total
Apparatus—continued	*Number*	*Number*	*Number*	*Number*
Gill nets	158	1,499	1,994	3,651
Yards	24,250	126,210	250,492	400,952
Beam trawls	11	1		12
Wheels			283	283
Lines:				
Hand lines (cod fishery)		27	22	49
Trawl lines (cod fishery)		5	1	6
Troll lines (salmon fishery)	3,047			3,047
Skates of lines (halibut fishery)	2,318			2,318
Crab pots	500	400		900
Crab nets		50		50
Herring pounds	3	17		20
Pound seines	15	11		26

CATCH: BY DISTRICTS

[Estimated round weight and value to fishermen]

Item	Southeast Alaska		Central Alaska		Western Alaska		Total	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
FISH								
Salmon:								
Blueback, red or sockeye	11,564,455	$203,113	57,606,360	$938,386	119,123,123	$1,872,431	188,293,938	$3,013,930
Chinook or king	11,283,210	181,218	2,557,700	50,403	2,551,800	21,988	16,392,710	253,609
Chum or keta	50,343,606	413,380	13,592,286	104,272	22,238,820	92,964	86,174,712	610,616
Humpback or pink	90,422,400	1,114,073	53,658,244	572,677	861,888	8,338	144,942,532	1,695,088
Silver or coho	11,115,248	129,256	5,578,888	62,514	38,024	488	16,732,160	192,258
Herring	90,011,137	360,045	34,076,470	170,382	3,490,478	17,453	127,578,085	547,880
Halibut	15,033,737	491,547	24,370	1,505			15,058,107	493,052
Cod			350,053	1,976	265,433	1,412	615,486	3,388
Trout:								
Dolly Varden	1,027	54	12,102	764			13,129	818
Steelhead	2,662	124					2,662	124
Sablefish	127,528	2,378					127,528	2,378
Smelt			7,650	357			7,650	357
Rockfishes	4,249	48					4,249	48
Total	279,909,259	2,895,236	167,464,123	1,903,236	148,569,566	2,015,074	595,942,948	6,813,546

Fisheries of Alaska, 1932—Continued

CATCH: BY DISTRICTS—Continued

Item	Southeast Alaska		Central Alaska		Western Alaska		Total	
SHELLFISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Crabs	229,894	$16,098	379,014	$29,379			608,908	$45,477
Shrimp	543,761	22,770	3,018	57			546,779	22,827
Clams:								
Butter	480	26	1,824	46			2,304	72
Razor			1,754,712	89,402			1,754,712	89,402
Total	774,135	38,894	2,138,568	118,884			2,912,703	157,778
Grand total	280,683,394	2,934,130	169,602,691	2,022,120	148,569,566	$2,015,074	598,855,651	6,971,324

NOTE.—In addition to the above, 270 whales were taken in Alaskan waters. The round weight and value to the fishermen cannot be determined, but the products amounte to 7,664,143 pounds, valued at $91,133.

Industries related to the fisheries of Alaska, 1932

TRANSPORTING

Item	Southeast Alaska	Central Alaska	Western Alaska	Total	Item	Southeast Alaska	Central Alaska	Western Alaska	Total
	Number	*Number*	*Number*	*Number*	Vessels transporting—continued	*Number*	*Number*	*Number*	*Number*
Persons engaged	408	478	375	1,261	Motor	98	120	64	282
Vessels transporting:					Net tonnage	2,680	5,050	1,989	9,719
Steam			13	13	Scows, houseboats, pile drivers, etc	206	232	161	599
Net tonnage			21,991	21,991					

WHOLESALE AND MANUFACTURING

Item	Southeast Alaska	Central Alaska	Western Alaska	Total
	Number	*Number*	*Number*	*Number*
Persons engaged	4,010	3,037	3,755	10,802
Establishments:				
Handling fresh and frozen fish	43	9		52
Curing fish	28	32	28	88
Canning fish	34	47	24	105
Manufacturing byproducts	6	5		11
Total (exclusive of duplication)	77	80	44	201

PRODUCTS AS PREPARED FOR MARKET

Item	Southeast Alaska		Central Alaska		Western Alaska		Total	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
FRESH								
Salmon (for food)	1, 095, 913	$70, 574					1, 095, 913	$70, 574
Salmon (for bait)	108, 900	330	7, 600	$38			116, 500	368
Herring (for bait)	2, 806, 210	25, 490	993, 000	7, 956			3, 799, 210	33, 446
Halibut	11, 478, 568	427, 181	13, 933	945			11, 492, 501	428, 126
Trout			4, 582	458			4, 582	458
Sablefish	43, 705	1, 281					43, 705	1, 281
Smelt			5, 100	357			5, 100	357
Rockfishes	762	18					762	18
Crabs:								
Meat	37, 968	10, 450	28, 485	6, 294			66, 453	16, 744
Whole in shell	18, 550	579	10, 380	519			28, 930	1, 098
Clams, whole in shell			240	50			240	50
Shrimp:								
Meat	298, 436	113, 678	1, 000	225			299, 436	113, 903
Whole in shell	1, 150	173	1, 200	60			2, 350	233
Total	15, 890, 162	649, 754	1, 065, 520	16, 902			16, 955, 682	666, 656
FROZEN								
Salmon (for food)	6, 116, 921	226, 204					6, 116, 921	226, 204
Salmon (for bait)	50, 000	200					50, 000	200
Herring (for bait)	2, 687, 605	14, 496					2, 687, 605	14, 496
Halibut	2, 051, 795	64, 366	8, 000	560			2, 059, 795	64, 926
Trout	1, 416	61	5, 100	306			6, 516	367
Sablefish	12, 240	192					12, 240	192
Rockfishes	2, 000	30					2, 000	30XX
Total	10, 921, 977	305, 549	13, 100	866			10, 935, 077	306, 415
CURED								
Salmon:								
Mild-cured	4, 241, 600	446, 035	17, 600	660	175, 200	$14, 809	4, 434, 400	461, 504
Pickled	16, 200	940	117, 275	7, 909	171, 935	11, 780	305, 410	20, 629
Dried and smoked			770	85	2, 390, 000	96, 258	2, 390, 770	96, 343
Herring:								
Pickled (for food) Scotch cure	2, 680, 825	127, 698	8, 342, 150	400, 532	1, 770, 250	90, 650	12, 793, 225	618, 880
Roused					422, 900	14, 520	422, 900	14, 520
Spiced	1, 200	200					1, 200	200
Dry-salted					145, 470	5, 091	145, 470	5, 091
Cod:								
Dry-salted			74, 345	1, 746	72, 000	1, 725	146, 345	3, 471
Stockfish			17, 100	1, 087	2, 500	56	19, 600	1, 143
Pickled			22, 468	674	8, 550	250	31, 018	924
Tongues			300	45			300	45
Sablefish, pickled	30, 774	905					30, 774	905
Total	6, 970, 599	575, 778	8, 592, 008	412, 738	5, 158, 805	235, 139	20, 721, 412	1, 223, 655

Industries related to the fisheries of Alaska, 1932—Continued

PRODUCTS AS PREPARED FOR MARKET—Continued

Item	Southeast Alaska		Central Alaska		Western Alaska		Total	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
CANNED								
Salmon:								
Blueback, red or sockeye	6,669,216	$795,250	31,687,728	$3,670,428	62,590,944	$7,334,191	100,947,888	$11,799,869
Chinook or king	1,133,952	113,907	1,550,496	196,736	652,800	68,665	3,337,248	379,308
Chum or keta	27,813,264	1,612,295	7,075,680	408,523	4,497,744	267,629	39,386,688	2,288,447
Humpback or pink	66,192,288	4,363,653	34,754,448	2,240,681	484,224	32,628	101,430,960	6,636,962
Silver or coho	4,177,824	365,144	2,912,352	244,189	22,224	1,882	7,112,400	611,215
Trout	1,248	117	----------	----------	----------	----------	1,248	117
Miscellaneous fish	1,440	288	1,536	640	2,064	430	5,040	1,358
Clams	240	130	878,148	447,188	----------	----------	878,388	447,318
Crabs	67,680	21,168	155,856	51,944	----------	----------	223,536	73,112
Total	106,057,152	7,271,952	79,016,244	7,260,329	68,250,000	7,705,425	253,323,396	22,237,706
BYPRODUCTS								
Fertilizer:								
Salmon	500,000	7,500	347,285	3,560	----------	----------	847,285	11,060
Whale	----------	----------	2,090,000	13,870	----------	----------	2,090,000	13,870
Meal, herring	15,298,179	183,898	3,920,300	46,008	----------	----------	19,218,479	229,906
Oil:								
Salmon	165,000	1,760	133,658	4,010	----------	----------	298,658	5,770
Herring	15,432,713	211,818	3,360,105	44,801	----------	----------	18,792,818	256,619
Whale	----------	----------	5,520,083	76,379	----------	----------	5,520,083	76,379
Sperm	----------	----------	54,060	884	----------	----------	54,060	884
Total	31,395,892	404,976	15,425,491	189,512	----------	----------	46,821,383	594,488
Grand total	171,235,782	9,208,009	104,112,363	7,880,347	73,408,805	7,940,564	348,756,950	25,028,920

NOTE.—Halibut products include all taken by the Alaska fleet, some of which were landed at other than Alaska ports. The total landings in Alaska in 1932 amounted to 4,562,988 pounds, valued at $134,652, as compared with 9,626,118 pounds, valued at $608,480, in 1931.

Supplementary table showing the pack of canned products in "standard cases" [1]

Item	Southeast Alaska		Central Alaska		Western Alaska		Total	
	Cases	*Value*	*Cases*	*Value*	*Cases*	*Value*	*Cases*	*Value*
Salmon:								
Blueback, red or sockeye	138,942	$795,250	660,161	$3,670,428	1,303,978	$7,334,191	2,103,081	$11,799,869
Chinook or king	23,624	113,907	32,302	196,736	13,600	68,665	69,526	379,308
Chum or keta	579,443	1,612,295	147,410	408,523	93,703	267,629	820,556	2,288,447
Humpback or pink	1,379,006	4,363,653	724,051	2,240,681	10,088	32,628	2,113,145	6,636,962
Silver or coho	87,038	365,144	60,674	244,189	463	1,882	148,175	611,215
Trout	26	117					26	117
Miscellaneous fish	30	288	32	640	43	430	105	1,358
Clams	16	130	58,543	447,188			58,559	447,318
Crabs	1,410	21,168	3,247	51,944			4,657	73,112
Total	2,209,535	7,271,952	1,686,420	7,260,329	1,421,875	7,705,425	5,317,830	22,237,706

[1] The pack of salmon, trout, miscellaneous fish, and crabs has been converted to "standard cases" of 48 1-pound cans, and clams to "standard cases" of 48 No. 1 5-ounce cans.

Supplementary table showing the output of byproducts in tons and gallons

Item		Southeast Alaska		Central Alaska		Total	
		Quantity	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
Fertilizer:							
Salmon	tons	250	$7,500	174	$3,560	424	$11,060
Whale	do			1,045	13,870	1,045	13,870
Meal, herring	do	7,649	183,898	1,960	46,008	9,609	229,906
Oil:							
Salmon	gallons	22,000	1,760	17,821	4,010	39,821	5,770
Herring	do	2,057,695	211,818	448,014	44,801	2,505,709	256,619
Whale	do			736,011	76,379	736,011	76,379
Sperm	do			7,208	884	7,208	884
Total			404,976		189,512		594,488

COMMON AND SCIENTIFIC NAMES OF FISHERY PRODUCTS

In order to prevent misunderstanding from the use of common names employed in the tables and discussions, the following list of common and scientific names is given:

Common and scientific names of the commercial fishery products caught in the United States and Alaska

Common name as shown in Bureau reports	Other common names	Scientific names
Albacore	Longfin tuna	*Germo alalunga* (*Pacific coast*).
	False albacore	*Euthynnus alleteratus* (Atlantic coast).
Alewives	Branch herring, walleyed or big-eyed herring.	*Pomolobus pseudoharengus*.
	Blueback, glut herring	*Pomolobus æstivalis*.
Amberjack		Seriola species.
Anchovies		*Engraulis mordax*. *Anchoviella delicatissima*. *Anchoviella compressa*.
Angelfish		*Pomacanthus arcuatus*. *Angelichtys isabelita*.
Barracuda		*Sphyræna argentea* (Pacific coast). *Sphyræna barracuda* (Atlantic coast).
Black bass	Smallmouth bass	*Micropterus dolomieu*.
	Largemouth bass	*Micropterus salmoides*.
Bluefish	Tailor	*Pomatomus saltatrix*.
Blue pike	Pike perch, blue pickerel (Canada).	*Stizostedion glaucum*.
Blue runner or hard-tail.	Runner	*Caranx crysos*.
Bonito		*Sarda sarda*. *Sarda chiliensis*.
Bowfin		*Amia calva*.
Buffalofish		Ictiobus species.
Bullhead		Ameiurus species.
Butterfish	Dollarfish	*Poronotus triacanthus*.
Burbot	Lawyer, ling	*Lota maculosa*.
Cabio	Coalfish, crab eater, cobia.	*Rachycentron canadus*.
Cabrilla	Rock bass	Paralabrax species.
Carp (German)		*Cyprinus carpio*.
Catfish		Siluridæ species.
Cero		*Scomberomorus regalis*.
Chubs	Tullibee in Canada; longjaws, bluefin, blackfin in United States.	All Leucichthys except *artedi* (in Great Lakes).
Cigarfish	Scad	Decapterus species.
Cisco	Herring in Canada	*Leucichthys artedi* (Lake Erie only).
Cod	Codfish	*Gadus macrocephalus* (Pacific coast). *Gadus callarias* (Atlantic coast).
Corbina	Orange mouth corbina	*Cynoscion xanthulum*.
Cowfish	Trunkfish, chapin	Ostracion species.
Crappie	White crappie	*Pomoxis annularis*.
	Black crappie, strawberry bass, calico bass.	*Pomoxis sparoides*.

Common and scientific names of the commercial fishery products caught in the United States and Alaska—Continued

Common name as shown in Bureau reports	Other common names	Scientific names
Crevalle		*Caranx hippos.*
Croaker	Crocus, hardhead	*Micropogon undulatus.*
Cunner	Chogset, blue perch, bergall.	*Tautogolabrus adspersus.*
Cusk		*Brosmius brosme.*
Dolly Varden trout	Salmon trout, bull trout	*Salvelinus parkei.*
Dolphin		*Coryphaena hippurus.*
Drum, black		*Pogonias cromis.*
Drum, red	Channel bass, redfish, spotted bass.	*Sciænops ocellatus.*
Eels		*Anguilla rostrata.* *Leptocephalus conger.* *Gymnothorax mordax.* *Gymnothorax moringua.*
Eulachon	Candlefish	*Thaleichthys pacificus.*
Flounders	Dabs, blackbacks, lemon sole, winter flounder, summer flounder.	Pleuronectidae species.
Flyingfish		*Cysilurus californicus.*
Frigate mackerel	"Wahoo"	*Auxis thazard.*
Garfish	Billfish, poundfish (salt-water species).	Tylosurus species. Ablennes species.
Gizzard shad	Nanny shad, mud shad	*Dorosoma cepedianum.*
Goldeye		Hiodon species.
Goldfish	Sand perch	*Carassius auratus.*
Goosefish		*Lophius piscatorius.*
Grayfish	Dogfish Spiny dog Smooth dog	*Squalus sucklii* (Pacific coast). *Squalus acanthias.* *Mustelus mustelus.*
Groupers	"Sea bass"	Epinephelus species. Mycteroperca species.
Grunts	Margatefish, sailors choice (Key West).	Hæmulon species.
Haddock		*Melanogrammus æglefinus.*
Hagfish	Slimefish	*Myxine glutinosa.*
Hake	Squirrel hake, Boston hake, ling, black hake, mud hake. Merluccio	Urophycis species (Atlantic coast). *Merluccius productus* (Pacific coast).
Halibut		*Hippoglossus hippoglossus.*
Halibut, "California"		*Paralichthys californicus.*
Hardhead		*Orthodon microlepidotus.*
Harvestfish	Starfish, pappyfish; butterfish (N.C.).	*Peprilus alepidotus.*
Herring:		
Lake	Herring	*Leucichthys artedi* (Great Lakes, except Erie).
Sea		*Clupea harengus* (Atlantic coast). *Clupea pallasii* (Pacific coast).
Herring smelt	Sea smelt	*Argentina silus.*
Hickory shad	Tailor shad	*Pomolobus mediocris.*
Hog-choker		*Achirus fasciatus.*
Hogfish	Capitaine, perro perro	*Lachnolaimus maximus* (Florida).
Horse mackerel		*Trachurus symmetricus* (Pacific coast).
Jewfish		*Promicrops itaiara.*
Kingfish		*Scomberomorus cavalla.*

Common and scientific names of the commercial fishery products caught in the United States and Alaska—Continued

Common name as shown in Bureau reports	Other common names	Scientific names
Kingfish (California)	Little roncador, croaker	*Genyonemus lineatus.*
King whiting	Northern whiting, kingfish, seamink.	Menticirrhus species.
Ladyfish	Bonefish, bananafish	*Albula vulpes.*
Lake trout		*Cristivomer namaycush.*
Launce	Sand eel, lant, sand launce.	*Ammodytes americanus.*
"Lingcod"	Cultus cod, blue cod, buffalo cod, ling.	*Ophiodon elongatus.*
Mackerel		*Scomber scombrus* (Atlantic coast). *Scomber diego* (Pacific coast).
Menhaden	Mossbunker, pogy	*Brevoortia tyrannus.*
Minnows		Cyprinidae species.
Mojarro		Eucinostomus species.
Mooneye	Toothed herring	Hiodon species.
Moonfish		*Vomer setipinnis.* *Selene vomer.*
Mullet	Jumping mullet	Mugil species.
Mummichog	Mayfish, killifish	Fundulus species.
Muttonfish		*Lutianus analis.*
Paddlefish	Spoonbill cat	*Polyodon spathula.*
Parrotfish		Scaridae species.
Perch (California)	(See surffishes.)	
Permit	Great pompano	*Trachinotus goodei.*
Pigfish	Hogfish (N.C.)	*Orthopristis chrysopterus.*
Pike or pickerel	Great Lakes pike	*Esox reticulatus.* *Esox lucius.*
Pilchard	Sardine	*Sardinia cærulea.*
Pilotfish		*Naucrates ductor.* *Seriole zonata.*
Pinfish	Bream, salt-water bream	*Lagodon rhomboides.*
Pollock		*Pollachius virens.*
Pompano		Trachinotus species (Atlantic coast). *Palometa simillima* (Pacific coast).
Porgies	Porgee	Calamus species.
Porkfish	Sisi	*Anisotremus virginicus.*
Quillback	Spearfish or skimfish	Carpiodes species.
Roach	Shiner	*Notemigonus crysoleucas.*
Rock bass	Redeye, goggle-eye	*Ambloplites rupestris* (Mississippi River and tributaries).
Rockfishes	Rock cod	Sebestodes species (Pacific coast).
Rosefish		*Sebastes marinus.*
Rudderfish	Blue bass, Green Fish Halfmoon	*Girella nigricans.* *Medialuna californiensis.*
Sablefish	Black cod	*Anaplopoma fimbria.*
Salmon:		
Atlantic		*Salmo salar* (Atlantic coast).
Pacific—		
Blueback, red or sockeye.		*Oncorhynchus nerka.*
Chinook or king	Tyee, Columbia, Sacramento, spring.	*Oncorhynchus tschawytscha.*
Chum or keta	Dog salmon	*Oncorhynchus keta.*
Humpback or pink.		*Oncorhynchus gorbuscha.*
Silver or coho		*Oncorhynchus kisutch.*
Steelhead		(See steelhead trout.)

Common and scientific names of the commercial fishery products caught in the United States and Alaska—Continued

Common name as shown in Bureau reports	Other common names	Scientific names
Sauger pike	Sand pike	*Stizostedion canadense.*
Sawfish		*Pristis pectinatus.*
Scamp		*Mycteroperca phenax.*
Sculpin		Cottidae species.
Scup	Paugy or porgy, fair maid.	Stenotomus species.
Sea bass	Black jewfish or black sea bass.	*Stereolepis gigas* (Pacific coast.)
	Black sea bass	*Centropristes striatus* (Atlantic coast).
Sea bass, white (California).		*Cynoscion nobilis* (Pacific coast).
Sea gar	Needlefish, billfish, houndfish.	Tylosurus species.
Sea robin		Prionotus species.
Shad	American shad	*Alosa sapidissima.*
Sharks		Carcharodon species; Mustelus species; Carcharhinus species; Sphyrna species.
Sheepshead (salt-water).		*Archosargus probatocephalus.*
Sheepshead (fresh-water).	Drum, fresh-water	*Aplodinotus grunniens.*
Sheepshead (Pacific coast).	Redfish, flat head	*Pimelometopon pulcher.*
Silversides	Spearing	Menidia species.
Silver perch	Sand perch	*Bairdiella chrysura.*
Skates		Raja species.
Skipper	"Billfish"	*Scomberesox saurus.*
Smelt		*Osmerus mordax* (Atlantic coast).
		Argentinidæ species (Pacific coast).
Snapper, Mangrove	Gray snapper	*Lutianus griseus.*
Snapper, red		*Lutianus blackfordii.*
Snook	Robalo, sergeantfish	*Centropomus undecimalis.*
Sole		*Psettichthys melanostictus* (Pacific coast).
Spadefish		*Chætodipterus faber.*
Spanish mackerel		*Scomberomorus maculatus.*
Spearfish		*Tetrapturus imperator.*
	Marlin	*Tetrapterus mitsukurii* (Pacific coast).
Splittail		*Pogonichthys macrolepidotus.*
Spot	Lafayette, goody	*Leiostomus xanthurus.*
Squawfish	Sacramento pike	*Ptychocheilus grandis.*
Squeteague (gray)	Gray trout, weakfish, trout.	*Cynoscion regalis.*
Squeteague (spotted)	Spotted weakfish, spotted trout.	*Cynoscion nebulosus.*
Squirrelfish		*Diplectrum formosum.*
Steelhead trout	Salmon trout	*Salmo gairdneri.*
Stingray		Dasyatis species.
Striped bass	Rockfish, rock	*Roccus lineatus.*
Sturgeon		Acipenser species.
Sturgeon, shovelnose		*Scaphirhynchus platorynchus.*
Sucker	Fresh-water mullet	Catostomidæ species.
Sunfish		Lepomis species.
		Centrarchidæ species.
Surf fishes		Embiotocidæ species.

Common and scientific names of the commercial fishery products caught in the United States and Alaska—Continued

Common name as shown in Bureau reports	Other common names	Scientific names
Swellfish	Puffer, swell toad, balloonfish, globefish.	*Spheroides maculatus.*
Swordfish		*Xiphias gladius.*
Tang		Hepatus species.
Tarpon	Silver king	*Tarpon atlanticus.*
Tautog	Blackfish, oysterfish	*Tautoga onitis.*
Tenpounder	Elops	*Elops saurus.*
Thimble-eyed mackerel.	Bullseye	*Scomber colias.*
Tilefish		*Lopholatilus chamæleonticeps.*
Tomcod		*Microgadus tomcod* (Atlantic coast). *Microgadus proximus* (Pacific coast).
Tripletail		*Lobotes surinamensis.*
Tuna and tunalike fishes:		
Albacore	Longfin tuna	*Germo alalunga.*
Bluefin tuna	Tuna, leaping tuna, (Pacific coast). "Horse mackerel" (Atlantic coast).	*Thunnus thynnus.*
Bonito		*Sarda sarda* (Atlantic coast). *Sarda chiliensis* (Pacific coast).
Skipjack	Striped tuna	*Euthynnus pelayms.*
Yellowfin tuna		*Neothunnus macropterus.*
Tullibee	(See chubs.)	
Turbot	Greenland halibut, American turbot.	*Reinhardtius hippoglossoides.* *Balistes carolinensis.*
White bass	White lake bass	*Roccus chrysops.*
Whitebait		Small fry of any fish.
Whitefish		*Coregonus clupeiformis* (Great Lakes). *Caulolatilus princeps* (Pacific coast).
Whitefish (Menominee).		*Coregonus clupeaformis.*
White perch		*Morone americana* (Atlantic coast).
Whiting	Silver hake	*Merluccius bilinearis.*
Wolffish		*Anarhichas lupus.*
Yellow bass		*Morone interrupta.*
Yellow perch		*Perca flavescens.*
Yellow pike	Wall-eyed pike, pike perch, dore.	*Stizostedion vitreum.*
Yellowtail		*Ocyurus chrysurus* (Atlantic coast). *Seriola dorsalis* (Pacific coast).
Wahoo		*Acanthocybium solandri.*
Abalone		Halotis species.
Clams:		
Hard	Round clam, cherrystone, quahog, little neck.	*Tivela stultorum* (Pacific coast). *Venus mercenaria* (Atlantic coast). *Venus mortoni* (Florida coast).
Cockle		*Cardium corbis.*
Soft	Sand clam, soft-shelled clam, nannynose, maninose.	*Mya arenaria.*

Common and scientific names of the commercial fishery products caught in the United States and Alaska—Continued

Common name as shown in Bureau reports	Other common names	Scientific names
Clams—Continued.		
Surf	Skimmer	*Mactra solidissima.*
Razor (Atlantic)		Siliqua species; Tagelus species.
Razor (Pacific)		*Siliqua patula.*
Pismo		*Tivela stultorum* (Pacific coast).
Conchs		Strombus species. Busycon species.
Crabs:		
Stone		*Menippi mercenaria.*
Soft	Soft-shelled crab, blue crab.	*Callinectes sapidus.*
Hard	Hard-shell crab, blue crab.	Do.
	Dungeness crab	*Cancer magister* (Pacific coast).
	Rock crab, hard crab	*Cancer irroratus* (Atlantic coast).
King	Horseshoe crab	Limulus.
Spider	Toad crab	*Hyas coarctatus.*
Crawfish	Crayfish	Cambarus species (Atlantic coast). Astacus species (Pacific coast).
Lobsters:		
Common		*Homarus americanus* (Atlantic coast).
Spiny	Rock lobster, crayfish	*Panulirus interruptus* (Pacific coast). *Panulirus argus* (Atlantic coast).
Mussels:		
Sea		*Mytilus californianus* (Pacific coast). *Mytilus edulis.*
Freshwater		Quadrula species. Lampsilis species. Symphynota species. Unio species.
Octopus		*Octopus punctatus* (Pacific coast).
Oysters:		
Eastern		*Ostrea elongata.*
Western	Olympia	*Ostrea lurida* (Pacific coast).
Japanese (introduced).		*Ostrea gigas.*
Periwinkles		Littorina species.
Scallops:		
Sea		*Pecten magellanicus.*
Bay		*Pecten irradians* (Atlantic coast). *Pecten æquisulcatus* (Pacific coast).
Shrimp		*Peneus setiferus.* *Peneus brasiliensis* (Atlantic and Gulf coasts). Pandalus species (Pacific coast). Pandalopsis species (Pacific coast). Crangon species (Pacific coast).

Common and scientific names of the commercial fishery products caught in the United States and Alaska—Continued

Common name as shown in Bureau reports	Other common names	Scientific names
Snails		Gastropoda species.
Squid		*Loligo opalescens* (Pacific coast). *Loligo pealei* (Atlantic coast).
Turtles:		
Green		*Chelonia mydas*.
Loggerhead		*Thalassochelys caretta*.
Hawksbill		*Chelonia inbricata*.
Snapping	Mud turtle, mossback	*Chelydra serpentina*.
Terrapin	Diamond-back terrapin	Malaclemmys species.
Frogs		Rana species.
Irish moss		*Chondrus crispus*.
Kelp		Macrocystis species; Nereocystis species; Pelagophycus species; Alaria species.
Sponges:		
Glove		*Spongia graminea* (Hyatt) *Euspongia officianalis* (L.).
Grass		*Hippospongia equina cerebriformis*.
Sheepswool		*Hippospongia canaliculata gossypina*.
Yellow		*Hippospongia equina elastica*.
Trepang	Sea cucumber	*Cucumaris frondosa; Thyone briareus*.

STATISTICAL SURVEY PROCEDURE

METHODS OF COLLECTION

In order that persons using the statistics in this report may judge as to their completeness and authenticity, there follows an outline of the methods employed by the Bureau in collecting fishery statistics. It will be noted that several methods are used. Each method has been carefully studied to obtain the best results with the available personnel.

General fishery statistics.—In the collection of general fishery statistics, data are usually obtained on the catch of fishery products and its value as landed by the fishermen, the quantity or number of each kind of gear used, the number of fishing boats, the number and net tonnage of fishing and transporting vessels, the number of wholesale establishments, the amount of wages and salaries paid in these establishments, the quantity and value of products prepared, and the number of persons engaged in each phase of the industry.

The scope of the coastal surveys includes the commercial fisheries of the oceans, bays, and coastal rivers as far inland as commercial fishing is important. This usually coincides with the range of commercial fishing for anadromous species. Statistics of the fisheries of the Mississippi River include the fisheries of the Mississippi River proper, as well as all tributaries wherein commercial fishing for either fish, crustaceans, or mollusks is prosecuted. Statistics of the lake fisheries include those prosecuted in the Great Lakes, adjacent bays, and the international lakes of northern Minnesota, as well as certain rivers having outlets into these waters.

Beginning in 1929 general fishery statistics have been collected on an annual basis for all of the marine and lake sections of the United States and Alaska, except that wholesale data were omitted for 1932.

In conducting these surveys it is the custom of the Bureau to dispatch agents to the districts to be surveyed early in the calendar year. (It should be noted that statistics on the catch of oysters for 1930 and subsequent years cover the calendar year. In previous years statistics for this mollusk were for the oyster season.) They obtain statistics on operations during the previous year. The agents conducting these surveys are trained men or recruits working under the close supervision of trained men. Recruits are permitted to work individually only after proving a satisfactory aptitude for the work during their training period. While it is impossible for the few agents available to interview each fisherman in a given locality, the more important ones are visited and a sufficient number of those of lesser importance are interviewed to obtain reliable information on their production. In practice, virtually all wholesale firms are visited, as well as captains of fishing vessels (those of 5 net tons or over) and also all the more important shore fishermen and representative small producers.

As an aid in locating fishermen, lists of vessels and motor-boat owners are obtained from local customhouses. It is also often possible to obtain the names of licensed commercial fishermen and occasionally some statistics of the catch from the various State fishery agencies. In the Great Lakes and Pacific Coast States such exceptional cooperation has been obtained from the State agencies in recent years that only fragmentary surveys are made by the Bureau to supplement missing data. Virginia and Maryland have recently adopted very complete statistical systems.

For the Great Lakes and international lakes of northern Minnesota the Bureau obtains most of the catch statistics and usually the value of the catch direct from the State records. To obtain data on the fishermen, boats, vessels, and gear the Bureau conducts such personal surveys among the fishermen as may be necessary to supplement the State records. Annual catch statistics are available since 1913.

Agents are stationed at Seattle, Wash., and Terminal Island, Calif., who survey each of the Pacific Coast States annually to supplement data that are missing from the State records. In most cases the value of the catch is derived from dealers' records and from estimates of prices. In Washington and Oregon the offshore fisheries are surveyed separately for units of operation, catch, and value of the catch. In almost all other respects the statistics are as collected by the States. Statistics of the wholesale industry for this section are obtained largely by personal interview.

The fisheries of Alaska are conducted primarily by large operators and sworn statements are required from these operators concerning their operations. These are collected and compiled by the Alaska Division of this Bureau.

Statistics on the catch of fish collected in the above general canvasses are shown in this report on the basis of round weight, that is, the weight of the fish as caught, except in the Pacific Coast States, where "as landed" weights are shown. In general in the Pacific Coast States halibut is landed heads on but eviscerated; swordfish may be landed headless and eviscerated; some salmon, especially that caught by troll lines, may be eviscerated; "lingcod", rockfishes, and sablefish may be landed eviscerated. The weight of cod caught off Alaska and shown in the Pacific coast tables has been converted to the basis of round weight.

Bulletins containing statistics for each section are released following the survey.

Landings at certain important United States ports.—Statistics of the landings at the principal New England ports (Boston and Gloucester, Mass., and Portland, Maine) are similarly obtained. An agent is permanently stationed at each of these ports. His duties include the obtaining of data on the quantity of fish landed each day by each fishing vessel, the value of such fish landed, information concerning the date of departure and arrival of the vessel, and he also indicates the grounds from which the fish were taken and the gear used in their capture. These data are forwarded to the Bureau, where compilations are made. Monthly statistical bulletins are issued for these landings as well as annual bulletins summarizing the year's activities.

Statistics of the landings of fish at Seattle, Wash., are collected by the Bureau's agent in that city. Landings are classified as those made by American fishing vessels and those received by Seattle wholesale dealers. The landings credited to United States fishing vessels are made by vessels operating distinctly as primary fishing units, usually in the offshore fisheries, while those credited as received by wholesale dealers are usually products of the shore fisheries collected mainly from points in Puget Sound and do not include fish received from Alaska or Canada, or landings made by the halibut fleet. Monthly statistical bulletins are issued for these landings as well as annual bulletins summarizing the year's activities.

Statistics on the landings of fish at New York City are obtained from J. H. Matthews, executive secretary of the Middle Atlantic Fisheries Association, while those for Groton, Conn., are obtained by the Bureau's agents. Statements of these landings are forwarded to the Bureau, where they are compiled. These statistics have not included the value of the catch. Monthly bulletins including these data are not issued; however, a summary is published in this document.

Statistics of the fishery products handled at the municipal wharf, Washington, D.C., are reported to the Bureau by agents of the city health department. They are not published in bulletin form, but a summary of the year's activities is published in the annual report of this Division.

Atlantic mackerel fishery.—Statistics on the catch by the Atlantic mackerel fleet are obtained by combining the figures of mackerel landed at Boston and Gloucester, Mass., and Portland, Maine, with those obtained by agents who in recent years have been stationed at other Atlantic ports where mackerel are landed. These agents obtain data on the fares of mackerel landed, similar to the data obtained on the landings by fishing vessels at the three New England ports. The figures include only the catches made by purse seine and drift gill net craft and are not complete for these gears for craft under 5 net tons capacity. Statistics of this fishery appear only in the annual reports of this Division, although the landings at the principal New England ports appear in the monthly and annual bulletins published for those ports.

Shad and alewife fisheries.—Owing to the importance of the Hudson and Potomac Rivers in the production of shad, surveys for statistics of the catch, value of the catch, and operating units are made annually. On the Potomac River similar statistics also are obtained for the alewife fishery. The surveys are conducted by agents in a manner similar to that employed in the collection of general fishery statistics, except that probably more fishermen are interviewed, as great care is exercised to make these convasses as accurate as possible.

The State of New York obtains statistics for the fisheries of the Hudson River that closely parallel those desired by the Bureau for this fishery, which alleviates the work on this river.

Statistics of the shad and alewife fisheries are not published separately in bulletin form, but a summary of the year's activities is published in the annual report of this Division.

Sponge market, Tarpon Springs.—A large proportion of the total output of sponges in Florida is handled through the sponge exchange at Tarpon Springs. In view of this, the Bureau has obtained from a representative of the exchange annual statistics of the quantity and value of the sponges, by variety classification, handled through it annually. Statistics of the quantity of sponges handled through the exchange are not published in bulletin form, but a summary of the year's activities is published in the annual reports of this division.

Pacific halibut fishery.—Statistics of the Pacific halibut fishery are obtained by the Bureau's agent in Seattle, aided by Bureau representatives in Alaska, and the International Fisheries Commission. The fleet classification has been arbitrarily applied by including in the "Washington fleet" all United States and Alaska vessels that land more than half of their catch in that State. All other United States and Alaska vessels of the halibut fleet are included in the "Alaska fleet." Monthly and annual statistical bulletins are available on this fishery, being published along with the statistics of the landings of fishery products at Seattle, Wash.

Canned fishery products and by-products.—Beginning in 1921, the Bureau has made annual surveys for statistics of the canned fishery products and by-products industries. These are begun the first week in January of each year for statistics of the production in the preceding year. The surveys usually occupy 6 to 9 weeks' time. During this period agents visit each plant in the United States where there is a production of canned fishery products or by-products. They obtain statistics of the production and value of the production for each commodity. In some instances, where plants are not easily reached by regular transportation facilities, returns are obtained by mail.

The value shown for canned products constitutes the gross amount received by the packer at the production point, no deductions being made for commission or expenses.

Statistics of the canned fishery products and by-products produced in Alaska are received on the same sworn statements that include statistics of the general fisheries. An annual statistical bulletin is issued on this trade.

Manufactured fishery products.—Statistics were obtained for 1930 for the first time on the total production of the many fishery products manufactured in the marine and lakes sections of the United States. In 1931 these statistics were expanded to include the Mississippi River and tributaries, but because of curtailed appropriations none of this material was obtained for 1932, except that made available through the canned fishery products and by-products, and packaged fish products surveys.

Packaged-fish trade.—Complete statistics of the annual production and value of fish packaged in the United States are obtained as a part of the survey for statistics of the canned fishery products and by-products industries. These statistics are published in bulletin form annually.

Cold-storage holdings of fish.—An arrangement has been made with the Bureau of Agricultural Economics, Department of Agriculture whereby statistics of the cold-storage holdings of the various species of fish, by sections of the United States, are furnished to this Bureau monthly. Included with statistics of the holdings are statements of the quantity of the various species of fish frozen and also the holdings of certain cured fish. Bulletins showing these statistics are issued monthly as well as annually.

Foreign fishery trade.—Statistics on the foreign fishery trade are obtained from compilations made by the Bureau of Foreign and Domestic Commerce. Statistics of all known fishery products imported or exported are assembled in one table and published annually in the report of this Division.

COMPILATION PRACTICES AND TERMS

Certain practices and terms of importance used in the compilation of fishery statistics are explained below.

Days absent.—In computing "days absent" for vessels landing fares at the various ports, the day of departure and the day of arrival are included; thus, a vessel leaving port on the 8th of the month and returning on the 15th of the month will be shown as being absent 8 days.

Operating units.—Operating units as referred to in this document include persons engaged and fishing craft and gear employed.

Vessel.—The term "vessel" refers to a craft having a capacity of 5 net tons or more.

Boat.—The term "boat" refers to a craft having a capacity of less than 5 net tons capacity.

Incidental catch.—The term "incidental catch" refers to the catch of certain species by a type of gear which ordinarily does not take appreciable amounts, if any, of such species.

Percentages.—Percentages are usually shown as whole numbers. Fractions of percents are dropped if less than five tenths, and the percentage is raised to the next higher integer if the fraction is greater than five tenths. If the fraction is exactly five tenths, the integer is raised or lowered to make it an even number.

Converting.—Many of the figures shown in the statistical tables published herewith have been reduced to thousands of pounds or dollars. In making these conversions the largest number from which a group of items is computed is raised or lowered to the nearest thousands place. If the number ends in an even 500, the thousands integer is raised or lowered to make it an even number. The individual items are changed to conform to the total thus obtained.

CONVERSION FACTORS

It is the policy of the Bureau to show the detailed catch figures of all products in pounds for the sake of uniformity and for purposes of comparison. Following such a policy presents very definite problems. In the case of fish there is little difficulty since in very rare instances are such products reported in units of measure other than pounds. For shellfish, however, the units of measure may be bushels, sacks, barrels, or thousands of shellfish, gallons of meat, etc. These many units make standardization difficult, but when coupled with the wide variation in the requirements or definition of some of these units in the various States the problem becomes even more complex.

All bivalve mollusks are reported in pounds of meats in the detailed catch tables presented in this report. In addition there is presented a supplementary table for each section on the production in bushels. These supplementary tables also give the production of certain other shellfish, such as crabs, in number.

Oysters.—Probably the greatest problem in presentation of fishery statistics in uniform units of measure is in the case of oysters. Usually the production of oysters on the Atlantic and Gulf coasts is reported to Bureau agents in bushels and prior to the data obtained for the year 1930 conversion from bushels to pounds of meats was effected on the basis of a uniform yield of 7 pounds of meat to the bushel. There follows a table which gives the results of a study of the measures used for oysters in the various States and of the average yields per bushel. This table presents the factors that have been used in the oyster statistics given in this report.

Measures and yields of oysters, 1932

State	Capacity of State bushel	Variation from United States standard bushel		Market oysters	
				Yield per State bushel	Yield per standard bushel
	Cubic inches	*Cubic inches*	*Percent*	*Pounds of meat*	*Pounds of meat*
Massachusetts	2,150.4			6.60	6.66
Rhode Island	2,150.4			6.50	6.50
Connecticut	2,150.4			6.75	6.75
New York	2,150.4			7.00	7.00
New Jersey	2,257.3	+106.9	+5.0	8.98	8.55
Delaware	2,257.3	+106.9	+5.0	6.15	5.86
Maryland	2,801.5	+650.1	+30.2	6.66	5.11
Virginia	3,003.4	+853.0	+39.7	6.51	4.66
North Carolina	2,801.9	+651.5	+30.3	5.71	4.38
South Carolina	4,071.5	+1,921.1	+89.3	4.76	2.51
Georgia	2,753.4	+603.0	+28.0	5.69	4.45
Florida	3,214.1	+1,063.7	+49.4	3.20	2.20
Alabama	2,826.2	+675.8	+31.4	2.40	1.83
Mississippi	2,826.2	+675.8	+31.4	2.19	1.67
Louisiana	2,148.4	−2.0	−0.1	4.14	4.14
Texas	2,700.0	+549.6	+25.6	5.05	4.02

Other mollusks.—The following table shows the conversion factors for various mollusks other than oysters used in this report.

Average yields of certain mollusks in pounds of meats per bushel, 1932

State	Clams, hard		Clams, soft		Clams, surf	Clams, razor	Mussels, sea	Periwinkles	Scallops, bay	Scallops, sea	Conchs	Cockles
	Public	Private	Public	Private								
Maine	11	------	15	------	------	------	10	20	------	6.75	------	------
Massachusetts	11	------	16.09	------	18	32	10	18	6.75	6.75	------	18
Rhode Island	11	11	15.61	------	------	------	------	------	6.75	------	------	18
Connecticut	10	------	14	------	------	------	------	20	------	6.75	------	------
New York	8	8	16	16	12	32	10	------	5	6	18	------
New Jersey	8.89	9.34	20	20	12.5	------	10	------	------	6	------	------
Delaware	10	------	------	------	------	------	13	------	------	------	------	------
Maryland	8	------	------	------	------	------	------	------	------	------	------	------
Virginia	8	------	------	------	------	------	------	------	6	6	------	------
North Carolina	8	------	------	------	------	------	------	------	5.5	------	------	------
South Carolina	8	------	------	------	------	------	------	------	------	------	------	------
Georgia	8	------	------	------	------	------	------	------	------	------	------	------
Florida	8	------	------	------	------	------	------	------	5.3	------	------	------

Other conversion factors.—The principal other conversion factors that have been used in this report are as follows:

Alewives	To convert number of fish to weight in pounds, multiply by 0.4.
Cod, large, salted	To convert to fresh-gutted weight, multiply by 1.90.
Cod, market, salted	To convert to fresh-gutted weight, multiply by 1.94.
Cod, scrod, salted	To convert to fresh-gutted weight, multiply by 1.98.
Crustaceans:	
Crabs, soft (Connecticut, New York, Virginia, and Maryland).	To convert number of crabs to weight in pounds, divide by 4.
Crabs, soft (North Carolina)	To convert number of crabs to weight in pounds, divide by 3.63.
Crabs, soft (other States)	To convert number of crabs to weight in pounds, divide by 3.
Crabs, hard (North Carolina)	To convert number of crabs to weight in pounds, divide by 4.
Crabs, hard (South Carolina and Georgia).	To convert number of crabs to weight in pounds, divide by 2.
Crabs, hard (Florida)	To convert number of crabs to weight in pounds, divide by 1.64.
Crabs, hard (Alabama and Texas)	To convert number of crabs to weight in pounds, divide by 1.72.
Crabs, hard (Mississippi)	To convert number of crabs to weight in pounds, divide by 1.92.
Crabs, hard (Louisiana)	To convert number of crabs to weight in pounds, divide by 1.86.
Crabs, hard (other States)	To convert number of crabs to weight in pounds, divide by 3.
Crabs, king	To convert number of crabs to weight in pounds, multiply by 3.75.
Crabs, rock	To convert number of crabs to weight in pounds, divide by 3.
Crabs, stone	To convert number of crabs to weight in pounds, multiply by 1.33.
Cusk, salted	To convert to fresh-gutted weight, multiply by 1.90.
Haddock, large, salted	To convert to fresh-gutted weight, multiply by 2.06.
Haddock, scrod, salted	To convert to fresh-gutted weight, multiply by 2.10.
Hake, large, salted	To convert to fresh-gutted weight, multiply by 1.90.

Hake, small, salted	To convert to fresh-gutted weight, multiply by 1.98.
Halibut, salted	To convert to fresh-gutted weight, multiply by 2.
Herring, salted	To convert to round weight, multiply by 1.50.
Mackerel, salted	To convert to round weight, multiply by 1.35.
Menhaden	To convert number of fish to weight in pounds, multiply by 0.6.
Oil (east coast)	To convert gallons to pounds, multiply by 7.74.
Oil (west coast)	To convert gallons to pounds, multiply by 7.5
Pollock, salted	To convert to fresh-gutted weight, multiply by 1.90.
Sponges, dried (Florida):	
Large wool	To convert number of bunches of sponges to weight in pounds, multiply by 2.5.
Small wool	To convert number of bunches of sponges to weight in pounds, multiply by 1.
Glove	To convert number of bunches of sponges to weight in pounds, multiply by 1.5.
Grass	To convert number of bunches of sponges to weight in pounds, multiply by 2.5.
Wire	To convert number of bunches of sponges to weight in pounds, multiply by 1.5.
Yellow	To convert number of bunches of sponges to weight in pounds, multiply by 1.5.

ALASKA FISHERY AND FUR-SEAL INDUSTRIES IN 1933 [1]

By Ward T. Bower, *Chief, Division of Alaska Fisheries*

CONTENTS

INTRODUCTION

The Bureau's work in Alaska, which pertains chiefly to the conservation of the fisheries and the management of the Pribilof Islands fur-seal industry, was carried on along the same general plan as in previous years, although some phases of the program were

[1] Appendix II to the Report of the U.S. Commissioner of Fisheries for 1934. Approved for publication, May 31, 1934.

considerably curtailed because of the limitation of funds. The Commissioner of Fisheries was in Alaska for a number of weeks inspecting both the fishery and fur-seal activities.

In the patrol of the fishing grounds to assure enforcement of the laws and regulations approximately 200 persons, including the crews on 14 vessels belonging to the Bureau and 2 chartered boats, were employed for varying periods. Observations were made of the extent and condition of the salmon runs and of the proportion that escaped capture. From time to time modifications were made in the regulations either to curtail commercial fishing in order to permit a more adequate seeding of the spawning beds, or to relax existing restrictions if the situation warranted.

Weirs for counting the escapement of spawning salmon were operated in only a few streams where important scientific studies of the biology of the Pacific salmons have been in progress for a number of years, or where the installation and maintenance of the structure could be accomplished by the stream guard in that locality in conjunction with his other duties. The operation of fish-cultural stations in Alaska by the Bureau was discontinued.

Reports of commercial fishery operations were collected, and data compiled therefrom are published herewith.

Sealing operations at the Pribilof Islands resulted in the take of 54,550 fur-seal skins, or 5,214 more than the number obtained in 1932. Practically all the killings were of 3-year-old surplus male seals. Observations indicated that the number of this age class not taken up in the drives was ample to provide for the future breeding stock. The computation of the fur-seal herd as of August 10, 1933, showed 1,318,568 animals of all classes, an increase of 98,607 over the number computed for the previous year. The fox herds on St. Paul and St. George Islands were fed during the winter and yielded 939 pelts in the 1933–34 season.

Some work was accomplished in the repair and improvement of buildings for the use of natives and for the sealing industry, and in the construction of roads to facilitate the delivery of sealskins from the killing grounds to the central plants.

Through the cooperation of the Navy Department the general shipment of supplies for the Pribilof Islands was forwarded on the U.S.S. *Vega*, and the sealskins taken during the season were brought out on the return trip to Seattle. Valuable assistance was rendered also by the United States Coast Guard in maintaining a patrol for the protection of the fur seals.

Two public-auction sales of fur-seal skins were held in 1933, at both of which fox skins were sold also.

Acknowledgment is made of the assistance rendered by members of the Bureau's staff in the preparation of this document.

VISIT OF THE COMMISSIONER OF FISHERIES TO ALASKA

The Commissioner of Fisheries sailed from Seattle aboard the *Brant* on June 6 for Alaska, where an extended survey of fishery conditions was made in all important salmon districts as far west as Bristol Bay. About 20 public hearings were held at various places to give all interested persons an opportunity to express their views.

Commissioner Bell was accompanied by Agent L. G. Wingard and by Dr. Willis H. Rich, of Stanford University, who for many years has been identified with the scientific studies of the Pacific salmons.

On July 6 Commissioner Bell was at St. Paul Island to observe the sealing activities. The *Penguin* was used for the voyage from Naknek to the Pribilofs and thence to Unalaska. At the latter point transfer was made to the *Brant*, which proceeded to Juneau, calling en route at Squaw Harbor, Chignik, Karluk, and other ports. Airplane travel between a number of points in southeast Alaska expedited the Commissioner's work in that district.

The press of other important business shortened the Alaska trip somewhat from the schedule originally planned, and the Commissioner returned to Seattle on July 22. After attending to various fishery matters in the Northwest he left for Washington, where he arrived on August 7.

FISHERY INDUSTRIES

As in corresponding reports for previous years, the Territory of Alaska is here considered in the three coastal geographic sections, generally recognized, as follows: (1) Southeast Alaska—embracing all that narrow strip of mainland and the numerous adjacent islands from Portland Canal northwestward to and including Yakutat Bay; (2) central Alaska—the region on the Pacific from Yakutat Bay westward, including Prince William Sound, Cook Inlet, and the southern coast of Alaska Peninsula, to Unimak Pass; and (3) western Alaska—the north shore of the Alaska Peninsula, including the Aleutian Islands westward from Unimak Pass, Bristol Bay, and the Kuskokwim and Yukon Rivers. These divisions are solely for statistical purposes and do not coincide with areas established in departmental regulations.

Detailed reports and statistical tables dealing with the various fishery industries are presented herewith, and there are also given the important features of certain subjects that were the objects of special investigation or inquiry.

NEW FISHERY REGULATIONS

The regulations for the protection of the fisheries of Alaska, issued December 20, 1932, were amended by the following regulations issued by the Acting Secretary of Commerce under the dates indicated:

[*January 6, 1933*]

ALASKA PENINSULA AREA

Salmon fishery.—1. Regulation no. 23 (*b*) is amended to read as follows: (1) Unimak Island: Along the coast on the west and south sides of Ikatan Bay from a point on False Pass (Isanotski Strait) indicated by a marker to a point at 54 degrees 46 minutes 44 seconds north latitude, 163 degrees 21 minutes 32 seconds west longitude, and from a point at 54 degrees 45 minutes 10 seconds north latitude, 163 degrees 19 minutes 30 seconds west longitude to a point on Louisiana Cove at 54 degrees 45 minutes 58 seconds north latitude, 163 degrees 8 minutes 52 seconds west longitude; and (2) mainland along the north side of Ikatan Bay within 2,500 feet of a point at 54 degrees 48 minutes 52 seconds north latitude, 163 degrees 18 minutes 38 seconds west longitude.

2. Regulation no. 23 (*n*) is amended to read as follows: Unga Island: East coast from a point at 55 degrees 12 minutes 10 seconds north latitude, 160

degrees 29 minutes 42 seconds west longitude, southerly and easterly to a point at 55 degrees 11 minutes 30 seconds north latitude, 160 degrees 27 minutes 30 seconds west longitude.

COOK INLET AREA

Salmon fishery.—Regulation no. 2 is amended to read as follows: The 36-hour weekly closed period for salmon fishing prescribed by section 5 of the act of June 6, 1924, is hereby extended to include the period from 6 o'clock antemeridian of Saturday of each week to 6 o'clock antemeridian of the Monday following, making a weekly closed period of 48 hours: *Provided*, That this extension of 12 hours closed period each week shall not be effective in the period from July 14 to August 1.

SOUTHEASTERN ALASKA AREA

ICY STRAIT DISTRICT

Salmon fishery.—Regulation no. 16 is amended to read as follows: Commercial fishing for salmon, except by trolling, is prohibited in Glacier Bay within a line from Point Carolus to Point Gustavus.

[*February 28, 1933*]

YUKON-KUSKOKWIM AREA

Salmon fishery.—Regulation no. 4 is amended to read as follows: King-salmon gill nets shall have a mesh of at least 8½ inches stretched measure between knots, red-salmon gill nets of linen webbing shall have a mesh of at least 5½ inches stretched measure between knots, and red-salmon gill nets of cotton webbing shall have a mesh of at least 5¼ inches stretched measure beween knots as measured when actually in use. No red-salmon gill net shall be over 28 meshes deep.

ALASKA PENINSULA AREA

Salmon fishery.—Regulation no. 17 is amended to read as follows: Commercial fishing for salmon along the mainland shore on the south side of Alaska Peninsula from a point on the coast 1 statute mile northwesterly of the outer extremity of Moss Cape to Castle Cape is prohibited prior to July 1 in each year: *Provided*, That fishing with gill nets along the mainland shore and adjacent islands between Kupreanof Point and Castle Cape may begin on June 1 in each year.

ALEUTIAN ISLANDS AREA

Herring fishery.—1. Commercial fishing for herring, except for bait purposes, by means of any seine is prohibited except in the period from July 15 to October 31, both dates inclusive.

2. Regulation no. 5 is amended to read as follows: Commercial fishing for herring, except for bait purposes, by means of any seine is prohibited west of 166 degrees west longitude.

3. Regulation no. 6 is amended to read as follows: Commercial fishing for herring, including bait fishing, by means of any purse seine more than 1,400 meshes in depth, more than 180 fathoms in length, or of mesh less than 1½ inches stretched measure between knots is prohibited.

COOK INLET AREA

Salmon fishery.—No trap shall be permitted to operate in the season of 1933 as follows:

1. Along the mainland coast on the east side of Cook Inlet (*a*) from 60 degrees 46 minutes north latitude to 60 degrees 45 minutes 20 seconds north latitude; (*b*) from 151 degrees 18 minutes 45 seconds west longitude to 151 degrees 20 minutes west longitude; (*c*) from 60 degrees 39 minutes 10 seconds north latitude to 60 degrees 38 minutes 34 seconds north latitude; (*d*) from 60 degrees 37 minutes 44 seconds north latitude to 60 degrees 37 minutes 10 seconds north latitude; (*e*) from 60 degrees 36 minutes 10 seconds north lati-

tude to a point 2½ statute miles north of the mouth of Kenai River; (*f*) from a point 2½ statute miles south of the mouth of Kenai River to 60 degrees 28 minutes 10 seconds north latitude; (*g*) from 60 degrees 27 minutes 50 seconds north latitude to 60 degrees 27 minutes north latitude; (*h*) from a point 2½ statute miles south of the mouth of Kasilof River to 60 degrees 21 minutes 10 seconds north latitude; (*i*) from 60 degrees 20 minutes north latitude to 60 degrees 19 minutes 39 seconds north latitude; (*j*) from 60 degrees 11 minutes 5 seconds north latitude to 60 degrees 12 minutes 20 seconds north latitude; and (*k*) within 2,500 feet of a point at 59 degrees 49 minutes north latitude, 151 degrees 50 minutes 10 seconds west longitude. (14*k*.)

2. Along the mainland coast on the east side of Cook Inlet from a point at 59 degrees 42 minutes 4 seconds north latitude, 151 degrees 47 minutes 50 seconds west longitude, to a point at 59 degrees 41 minutes 33 seconds north latitude, 151 degrees 46 minutes 30 seconds west longitude. (14*l*.)

3. Along the mainland coast on the east side of Cook Inlet (*a*) on the west side of Nubble Point Spit within 1,200 feet of a point at 59 degrees 28 minutes 45 seconds north latitude, 151 degrees 35 minutes 6 seconds west longitude, and (*b*) within 1,000 feet of a point at 59 degrees 28 minutes 30 seconds north latitude, 151 degrees 37 minutes west longitude. (14*m*.)

4. Along the mainland coast on the east side of Cook Inlet from a point at 59 degrees 26 minutes 30 seconds north latitude, 151 degrees 46 minutes west longitude, westerly to a point at 59 degrees 26 minutes 40 seconds north latitude, 151 degrees 46 minutes 45 seconds west longitude. (14*n*.)

5. Along the mainland coast on the east side of Cook Inlet within 1,000 feet of a point at 59 degrees 25 minutes 35 seconds north latitude, 151 degrees 52 minutes west longitude. (14*o*.)

6. Along the mainland coast on the east side of Cook Inlet from a point at 59 degrees 21 minutes 28 seconds north latitude, 151 degrees 55 minutes west longitude, southwesterly to a point at 59 degrees 19 minutes 20 seconds north latitude, 151 degrees 58 minutes 30 seconds west longitude. (14*p*.)

The number and letter after each regulation refer to the original regulation as printed in Department of Commerce Circular No. 251, nineteenth edition, dated December 20, 1932, and have been included herein for convenience in referring to the original regulation.

PRINCE WILLIAM SOUND AREA

Salmon fishery.—No trap shall be permitted to operate in the season of 1933 as follows:

1. Along the coast of Squire Island within ½ statute mile of its southern extremity. (12*b*.)

2. Eastern coast of Chenega Island from a point at 60 degrees 17 minutes 10 seconds north latitude to a point 1 statute mile eastward of Chenega Village. (12*c*.)

3. Eastern coast of Culross Island: (*a*) Within 5,000 feet northeasterly of a point on the southeast coast at 148 degrees 8 minutes 45 seconds west longitude, and (*b*) from 60 degrees 43 minutes 45 seconds north latitude northerly to a point at 60 degrees 45 minutes north latitude, 148 degrees 8 minutes 30 seconds west longitude. (12*e*.)

4. Within 1 statute mile eastward of the southwestern extremity of Naked Island. (12*f*.)

5. Along the mainland eastward and northward from the outermost extremity of Point Pellew to 60 degrees 51 minutes north latitude. (12*g*.)

6. Along the mainland within 1 statute mile of the outer extremity of Granite Point, near Fairmount Island. (12*h*.)

7. Western side of Valdez Arm from Point Freemantle to 60 degrees 56 minutes 30 seconds north latitude. (12*i*.)

8. Southwest coast of Bligh Island from 60 degrees 48 minutes 37 seconds north latitude to 146 degrees 44 minutes 20 seconds west longitude. (12*j*.)

9. Within ½ statute mile of the southwestern extremity of Bidarka Point. (12*k*.)

10. Mainland coast from a point at 60 degrees 40 minutes 56 seconds north latitude, 146 degrees 39 minutes 36 seconds west longitude, to a point east of Knowles Head at 146 degrees 36 minutes 20 seconds west longitude. (12*o*.)

11. From a point on the coast 1 statute mile northwestward of the light at Gravina Point to a point on the coast 2 statute miles northwestward of the light at Gravina Point. (12*q*.)

12. Hinchinbrook Island: Within 3,000 feet, measured westerly along the north side of a peninsula, from a point at 60 degrees 28 minutes 47 seconds north latitude, 146 degrees 23 minutes 27 seconds west longitude. (12*t*.)

13. From a point on the coast at 60 degrees 28 minutes north latitude northward to the light at Johnstone Point. (12*w*.)

14. Hinchinbrook Island: From a point on the coast 2½ statute miles north of the southwestern extremity of Bear Cape northward to a point at 60 degrees 24 minutes north latitude. (12*x*.)

15. Montague Island: Western coast from a point south of Macleod Harbor at 59 degrees 51 minutes 45 seconds north latitude to 59 degrees 50 minutes 49 seconds north latitude. (12*z*.)

16. Montague Island: Western coast from Point Woodcock to a point at 59 degrees 55 minutes 30 seconds north latitude (12*aa*.)

17. Montague Island: Western coast (*a*) from 60 degrees 4 minutes 30 seconds north latitude to 60 degrees 5 minutes 30 seconds north latitude, and (*b*) from 60 degrees 7 minutes 30 seconds north latitude to 60 degrees 9 minutes 45 seconds north latitude. (12*bb*.)

18. Montague Island: Northern coast (*a*) from Graveyard Point to 60 degrees 21 minutes 41 seconds north latitude, 147 degrees 9 minutes 47 seconds west longitude, and (*b*) from a point 1 statute mile southwest of Montague Point to Montague Point. (12*dd*.)

The number and letter after each regulation refer to the original regulation as printed in Department of Commerce Circular No. 251, nineteenth edition, dated December 20, 1932, and have been included herein for convenience in referring to the original regulation.

Southeastern Alaska Area

WESTERN DISTRICT

Salmon fishery.—Regulation no. 19 (*m*) is amended to read as follows: Admiralty Island: West coast (1) from a point ¾ statute mile north of Parker Point to 57 degrees 47 minutes north latitude, (2) from 57 degrees 49 minutes 55 seconds north latitude to 57 degrees 51 minutes north latitude, and (3) from 57 degrees 53 minutes 30 seconds north latitude to 58 degrees 2 minutes north latitude.

EASTERN DISTRICT

Salmon fishery.—1. Regulation no. 14 is amended to read as follows: Purse seines are prohibited in Lynn Canal and contiguous waters north of 58 degrees 28 minutes north latitude.

2. Regulation no. 16 (*p*) is amended to read as follows: Kuiu Island: Northwest coast (1) within 2,500 feet of a point at 56 degrees 33 minutes 9 seconds north latitude, 134 degrees 17 minutes 55 seconds west longitude, (2) from a point 1 statute mile north of the north side of the entrance to Washington Bay to 56 degrees 45 minutes 50 seconds north latitude, (3) from 56 degrees 47 minutes 45 seconds north latitude to 56 degrees 48 minutes 5 seconds north latitude, and (4) from 56 degrees 50 minutes 20 seconds north latitude to the point at the east side of the entrance to Band Cove.

SOUTH PRINCE OF WALES ISLAND DISTRICT

Salmon fishery.—1. Regulation no. 14 (*g*) is amended to read as follows: Long Island, east of Dall Island: (1) Within 2,500 feet of a point at 54 degrees 56 minutes 13 seconds north latitude, 132 degrees 43 minutes 5 seconds west longitude, and (2) east and west coasts within 2,500 feet measured along the coast from 54 degrees 46 minutes 15 seconds north latitude.

2. Regulation no. 14 (*l*) is amended to read as follows: (1) Coast line of unnamed island within 2,500 feet of a point at 54 degrees 45 minutes 33 seconds north latitude, 132 degrees 22 minutes 17 seconds west longitude, and (2) within 2,500 feet of the northwestern extremity of the unnamed island at 54 degrees 43 minutes 9 seconds north latitude, 132 degrees 19 minutes 17 seconds west longitude.

ALL DISTRICTS

The regulations for the protection of the fisheries of southeastern Alaska as described in Department of Commerce Circular No. 251, nineteenth edition, issued December 20, 1932, and subsequent supplements thereto, are based upon

Coast and Geodetic Survey charts which have been prepared on the southeastern Alaska datum and not on charts which have been recently reissued on the North American 1927 datum.

[*March 2, 1933*]

PRINCE WILLIAM SOUND, COPPER RIVER, AND BERING RIVER AREAS

Clam fishery.—1. Regulation no. 3 is amended to read as follows: The taking of razor clams for commercial purposes is prohibited from July 1 to August 15, both dates inclusive, in each calendar year.

2. Regulation no. 4 is amended to read as follows: In the open season from January 1 to June 30, both dates inclusive, there shall not be taken in the Prince William Sound, Copper River, and Bering River Areas, a combined total of more than 800,000 pounds of razor clams, including shells, or 20,000 cases upon the basis of 48 one-half pound cans per case.

3. Regulation no. 5 is amended to read as follows: In the open season from August 16 to December 31, both dates inclusive, there shall not be taken in the Prince William Sound, Copper River, and Bering River Areas, a combined total of more than 400,000 pounds of razor clams, including shells, or 10,000 cases upon the basis of 48 one-half pound cans per case.

SOUTHEASTERN ALASKA AREA

WESTERN DISTRICT

Salmon fishery.—Regulation no. 17 is amended to read as follows: Commercial fishing for salmon is prohibited (1) in all bays tributary to Tenakee Inlet and in the waters of Tenakee Inlet west of 135 degrees 40 minutes west longitude, and (2) within 1 statute mile of the mouths of all salmon streams in Freshwater Bay: *Provided*, That these prohibitions shall not apply to trolling from January 1 to 6 o'clock postmeridian August 24.

EASTERN DISTRICT

Salmon fishery.—1. Regulation no. 17 (*e*) is amended to read as follows: Gambier Bay, east coast of Admiralty Island: All waters west of 134 degrees 3 minutes west longitude.

2. Regulation no. 17 (*n*) is amended to read as follows: Saginaw Bay, northwest coast of Kuiu Island: All waters of the bay within a line from a point on the southwest shore at 56 degrees 51 minutes 30 seconds north latitude to a point on the northeast shore at 56 degrees 53 minutes north latitude.

NORTH PRINCE OF WALES ISLAND DISTRICT

Salmon fishery.—1. Regulation no. 14 is amended to read as follows: Commercial fishing for salmon is prohibited in all waters of Bradfield Canal east of 131 degrees 49 minutes west longitude: *Provided*, That this prohibition shall not apply to trolling prior to 6 o'clock antemeridian June 1 and after 6 o'clock postmeridian September 30 in each year.

2. All commercial fishing for salmon is prohibited within 1 statute mile outside the mouth of Anan Creek.

3. Regulation no. 15 is amended to read as follows: Commercial fishing for salmon is prohibited in all waters of Blake Channel and Eastern Passage between 56 degrees 14 minutes north latitude and 132 degrees 6 minutes west longitude, and in all bays and inlets tributary to Eastern Passage: *Provided*, That this prohibition shall not apply to trolling prior to 6 o'clock antemeridian June 1 and after 6 o'clock postmeridian September 30 in each year.

4. Regulation no. 18 (*a*) is amended to read as follows: Moira Sound, east coast of Prince of Wales Island: South Arm south of 54 degrees 57 minutes 30 seconds north latitude, all waters in Frederick Cove, Kegan Cove, and within 1,000 yards of the mouths of all salmon streams in Johnson Cove.

5. Regulation no. 18 (*d*) is amended to read as follows: Skowl Arm, Prince of Wales Island: McKenzie Inlet south of 55 degrees 21 minutes 30 seconds north latitude, and Polk Inlet south of 55 degrees 25 minutes 10 seconds north latitude.

6. Regulation no. 18 (*f*) is amended to read as follows: Kasaan Bay, east coast of Prince of Wales Island: Within a line from a point at 55 degrees 38

minutes 15 seconds north latitude, 132 degrees 30 minutes 54 seconds west longitude, to a point at 55 degrees 36 minutes 15 seconds north latitude, 132 degrees 30 minutes 15 seconds west longitude.

7. Regulation no. 18 (*g*) is amended to read as follows: Thorne and Tolstoi Bays, east coast of Prince of Wales Island: Within 1 statute mile of the mouths of all salmon streams, and all waters of Thorne Bay west of 132 degrees 28 minutes 40 seconds west longitude.

8. Regulation no. 18 (*aa*) is amended to read as follows: Affleck Canal, southeastern coast of Kuiu Island: Bear Harbor north of 56 degrees 15 minutes north latitude, and East Arm north of 56 degrees 17 minutes 30 seconds north latitude.

9. Regulation no. 18 (*dd*) is amended to read as follows: El Capitan Passage, between Kosciusko Island and Prince of Wales Island: El Capitan Passage and contiguous waters between 56 degrees 7 minutes 30 seconds north latitude and a line extending due north from the point of land on Kosciusko Island at 56 degrees 8 minutes 47 seconds north latitude, 133 degrees 27 minutes 40 seconds west longitude, including all waters of Devilfish Bay.

SOUTH PRINCE OF WALES ISLAND DISTRICT

Salmon fishery.—Regulation no. 15 (*l*) is amended to read as follows: Hunter Bay, southwest coast of Prince of Wales Island: All waters in the north arm of Hunter Bay, and within 1 statute mile outside the mouths of all salmon streams.

SOUTHERN DISTRICT

Salmon fishery.—1. Regulation no. 17 (*h*) is amended to read as follows: Smeaton Bay, indenting mainland: Within 1 statute mile outside the mouth of the salmon stream in Wilson Arm, and all waters of Bakewell Arm east of 130 degrees 40 minutes west longitude.

2. Regulation no. 17 (*o*) is amended to read as follows: Naha Bay, west shore of Revillagigedo Island: Within 1 statute mile of the falls at the outlet of Roosevelt Lagoon.

[*March 7, 1933*]

BERING RIVER AREA

Salmon fishery.—1. Commercial fishing for salmon is prohibited prior to 6 o'clock antemeridian May 15 and from 6 o'clock postmeridian July 5 to 6 o'clock antemeridian August 10 in each year.

2. Prior to 6 o'clock antemeridian June 1 in each year commercial fishing with nets of mesh less than 8½ inches stretched measure between knots is prohibited.

3. From June 1 to July 5, both dates inclusive, the 36-hour closed period for salmon fishing prescribed by section 5 of the act of June 6, 1924, is hereby extended to include the period from 6 o'clock antemeridian of Saturday of each week until 6 o'clock antemeridian of the Monday following, making a weekly closed period of 48 hours.

4. Commercial fishing for salmon is prohibited after 6 o'clock postmeridian September 20 in each calendar year.

5. Commercial fishing for salmon shall be conducted solely by drift gill nets without the attachment of anything to obstruct their free movement through the water at all times: *Provided,* That gill nets attached to anchored boats or other anchored floating equipment may also be used from 6 o'clock antemeridian August 10 to 6 o'clock postmeridian September 20 in each calendar year.

6. Each gill net in operation shall be marked by a cluster of floats or corks at the ends, and double floats or corks shall be attached to the cork line at 25-fathom intervals. The clusters of floats or corks at the ends and the double floats or corks at the 25-fathom intervals of every red-salmon and silver-salmon gill net shall be painted bright red. The clusters of floats or corks at the ends and the double floats or corks at the 25-fathom intervals of every king-salmon gill net shall be painted white. The clusters at the ends of all gill nets shall also be legibly and plainly marked with the initials of the operator. In addition, each red-salmon and silver-salmon gill net shall be marked by red kegs attached to the clusters of floats or corks at the ends, and each king-salmon gill net shall be marked with white kegs attached to the clusters of floats or corks at the ends.

7. Prior to 6 o'clock antemeridian August 10 in each calendar year the total aggregate length of drift gill nets on any salmon fishing boat, or in use by such boat, shall not exceed 175 fathoms hung measure: *Provided*, That during the period from 6 o'clock antemeridian June 1 to 6 o'clock postmeridian June 15 any gill-net boat in the Bering River area may carry and operate not to exceed 75 fathoms of net of mesh not less than 8½ inches stretched measure between knots in addition to 175 fathoms of smaller mesh net.

8. The trailing of web behind any fishing boat is prohibited above the markers fixing closed waters.

9. Anchored gill nets shall be operated in substantially a straight line.

Southeastern Alaska Area

Shrimp fishery.—Commercial fishing for shrimps is prohibited in the period from April 1 to April 30, both dates inclusive, in each year.

[*March 23, 1933*]

Prince William Sound Area

Salmon fishery.—1. Regulation no. 13 (*f*) is amended to read as follows: Simpson Bay: All waters within 500 yards of the mouth of the stream at the head of the west arm of the bay.

2. Regulation no. 13 (*g*) is amended to read as follows: Sheep Bay: All waters within 1,000 yards of the mouth of the stream at the head of the bay.

3. Regulation no. 13 (*h*) is amended to read as follows: Gravina River: All waters within 1,000 yards of the mouth of the river.

4. Regulation no. 13 (*l*) is amended to read as follows: Whalen Bay, south side of Port Fidalgo: All waters east of 146 degrees 15 minutes 30 seconds west longitude.

5. Regulations nos. 13 (*r*) and 13 (*s*) are amended to read as follows: Unakwik Inlet and tributary waters, indenting mainland on north shore of Prince William Sound: All waters within 1,000 yards of the mouth of any salmon stream.

6. Regulation no. 13 (*v*) is amended to read as follows: Port Nellie Juan: All waters within 500 yards of the mouth of any salmon stream.

7. Regulation no. 13 (*y*) is amended to read as follows: Jackpot Bay: All waters within a line indicated by markers located at the entrance to the narrows in the bay.

8. Regulation no. 13 (*z*) is amended to read as follows: Port Bainbridge: All waters in Hogg Bay within 500 yards of the mouth of any salmon stream.

9. Regulation no. 13 (*bb*) is amended to read as follows: Bay of Isles, indenting east shore of Knight Island: All waters within 1,000 yards of the mouth of the stream at the head of the west arm of the bay.

Bering River Area

Salmon fishery.—All commercial fishing for salmon is prohibited in Controller Bay and contiguous waters north of a line extending due east from Point Hey.

Southeastern Alaska Area

WESTERN DISTRICT

Salmon fishery.—1. Regulation no. 6 is amended to read as follows: Commercial fishing for salmon, other than trolling, north of a true line eastward from the southeastern extremity of Point Couverden is prohibited prior to 6 o'clock antemeridian June 15 and after 6 o'clock postmeridian August 10 in each calendar year: *Provided*, That this prohibition shall not apply to the use of gill nets from 6 o'clock postmeridian August 10 to 6 o'clock postmeridian August 20 and from 6 o'clock antemeridian September 5 to 6 o'clock postmeridian September 30 in Lynn Canal and contiguous waters north of the north end of Sullivan Island.

2. Regulation no. 14 is amended to read as follows: Purse seines are prohibited in Lynn Canal and contiguous waters north of 58 degrees 34 minutes 10 seconds north latitude.

3. Regulation no. 15 is amended to read as follows: Commercial fishing for salmon in Chilkat Inlet is prohibited north of 59 degrees 10 minutes 24 seconds north latitude, except that in these closed waters outside of a line from Green Point passing across the southern shore of Pyramid Island such fishing is permitted by gill nets from 6 o'clock antemeridian September 5 to 6 o'clock postmeridian September 30 in each year.

4. Regulation no. 16 is amended to read as follows: Commercial fishing for salmon in Chilkoot Inlet within a line 1 statute mile from the mouth of Chilkoot River is prohibited, except that in these closed waters outside of a line 1,000 yards from the mouth of Chilkoot River such fishing is permitted by gill nets from 6 o'clock antemeridian September 5 to 6 o'clock postmeridian Sepember 30 in each year.

EASTERN DISTRICT

Salmon fishery.—Regulation no. 1 in supplement No. 251–19–2 is amended to read as follows: Purse seines are prohibited in Lynn Canal and contiguous waters north of 58 degrees 34 minutes 10 seconds north latitude.

[*March 31, 1933*]

ALASKA PENINSULA AREA

Salmon fishery.—Regulation no. 2 in supplement No. 251–19–1 is amended to read as follows: Unga Island: East coast (1) within 2,500 feet of a point at 55 degrees 11 minutes 42 seconds north latitude, 160 degrees 27 minutes 38 seconds west longitude, and (2) within 2,500 feet of a point at 55 degrees 13 minutes 29 seconds north latitude, 160 degrees 29 minutes 37 seconds west longitude.

KODIAK AREA

Salmon fishery.—1. Regulation no. 19 (*n*) is amended to read as follows: Russian Harbor, southern coast of Kodiak Island: All waters within 1 statute mile of the mouth of the salmon stream in the harbor.

2. Commercial fishing for salmon between Cape Kiavak and Cape Trinity, including all waters of the adjacent islands between those capes and all waters of the Trinity Islands, except by set or anchored gill nets, is prohibited.

SOUTHEASTERN ALASKA AREA

NORTH PRINCE OF WALES ISLAND DISTRICT

Salmon fishery.—Regulation no. 6 in supplement No. 251–19–3 is amended to read as follows: Kasaan Bay, east coast of Prince of Wales Island: Within 1 statute mile of the mouth of any salmon stream in Karta Bay.

SOUTHEASTERN ALASKA AREA

Herring fishery.—Regulation no. 8 is amended to read as follows: Commercial fishing for herring, except for bait purposes, is prohibited from 6 o'clock antemeridian of Saturday of each week until 6 o'clock postmeridian of the Sunday following.

[*May 17, 1933*]

ALASKA PENINSULA AREA

Salmon fishery.—1. Regulation no. 16 is amended to read as follows: Commercial fishing for salmon along the mainland shore on the south side of Alaska Peninsula from a point on the west side of the entrance to Sankin Bay at 54 degrees 49 minutes 9 seconds north latitude, 163 degrees 18 minutes 6 seconds west longitude, easterly to Morgan Point is prohibited prior to July 15, in each year: *Provided*, That this prohibition shall not apply to the waters of Morzhovoi Bay west of 163 degrees 1 minute 45 seconds west longitude after 6 o'clock antemeridian June 1 in each year.

2. Regulation no. 23 (*c*) permitting the operation of a trap on Unimak Island within 2,500 feet of a point in East Anchor Cove at 54 degrees 41 minutes 12 seconds north latitude, 163 degrees 3 minutes 36 seconds west longitude, is revoked.

3. Regulation no. 23 (*q*) permitting the operation of a trap on Korovin Island within 2,500 feet of a point at 55 degrees 25 minutes 18 seconds north latitude, 160 degrees 9 minutes 25 seconds west longitude, is revoked.

Herring fishery.—Regulation no. 3 is amended to read as follows: Commercial fishing for herring, except for bait purposes, is prohibited from 6 o'clock antemeridian of Saturday of each week until 6 o'clock postmeridian of the Sunday following.

Aleutian Islands Area

Herring fishery.—Regulation no. 2 is amended to read as follows: Commercial fishing for herring, except for bait purposes, is prohibited from 6 o'clock antemeridian of Saturday of each week until 6 o'clock postmeridian of the Sunday following.

Chignik Area

Salmon fishery.—Regulation no. 4 is amended to read as follows: Set or anchored gill nets shall be operated in substantially a straight line: *Provided*, That not to exceed 12 feet of each net may be used as a hook. Only one such hook is permitted on a net.

Herring fishery.—Regulation no. 3 is amended to read as follows: Commercial fishing for herring, except for bait purposes, is prohibited from 6 o'clock antemeridian of Saturday of each week until 6 o'clock postmeridian of the Sunday following.

Kodiak Area

Salmon fishery.—Regulation no. 18 (*g*) permitting the operation of a trap on Kodiak Island within 2,500 feet of a point at 57 degrees 57 minutes 46 seconds north latitude, 153 degrees 9 minutes 37 seconds west longitude, is revoked.

Herring fishery.—Regulation no. 1 is amended to read as follows: Commercial fishing for herring, except for bait purposes, is prohibited during the period from January 1 to June 14, both dates inclusive.

Prince William Sound Area

Herring fishery.—1. Regulation no. 1 is amended to read as follows: Commercial fishing for herring, except for bait purposes, is prohibited from January 1 to June 14, both dates inclusive, and from November 16 to December 31, both dates inclusive: *Provided*, That this prohibition shall not apply to the use of set and drift gill nets of mesh not smaller than 2½ inches stretched measure between knots in the period from November 16 to December 15, both dates inclusive.

2. Regulation no. 2 is amended to read as follows: Commercial fishing for herring, except for bait purposes, is prohibited from 6 o'clock antemeridian of Saturday of each week until 6 o'clock postmeridian of the Sunday following.

Copper River Area

Salmon fishery.—Regulation no. 7 is amended to read as follows: Prior to 6 o'clock antemeridian August 10 in each calendar year the total aggregate length of drift gill nets on any salmon fishing boat or in use by such boat, shall not exceed 200 fathoms hung measure: *Provided*, That during the period from 6 o'clock antemeridian May 15 to 6 o'clock postmeridian May 31 any gill-net boat in the Copper River area may carry and operate not to exceed 100 fathoms of net of mesh not less than 8½ inches stretched measure between knots in addition to 200 fathoms of smaller mesh net.

Bering River Area

Salmon fishery.—Regulation no. 7 in supplement no. 251-19-4, issued March 7, 1933, is amended to read as follows: Prior to 6 o'clock antemeridian August 10 in each calendar year the total aggregate length of drift gill nets on any salmon fishing boat, or in use by such boat, shall not exceed 200 fathoms hung measure: *Provided*, That during the period from 6 o'clock antemeridian June 1 to 6 o'clock postmeridian June 15 any gill-net boat in the Bering River area may carry and operate not to exceed 100 fathoms of net of mesh not less than 8½ inches stretched measure between knots in addition to 200 fathoms of smaller mesh net.

Southeastern Alaska Area

EASTERN DISTRICT

Salmon fishery.—Regulation no. 16 (*a*) permitting the operation of a trap on Shelter Island within 2,000 feet of a point at 58 degrees 27 minutes 4 seconds north latitude, 134 degrees 54 minutes west longitude, is revoked.

NORTH PRINCE OF WALES ISLAND DISTRICT

Salmon fishery.—Regulation no. 16 is amended to read as follows: All commercial fishing for salmon is prohibited within 500 yards of the mouth of any salmon stream in Wrangell Narrows between Point Alexander and Prolewy Point.

SOUTH PRINCE OF WALES ISLAND DISTRICT

Salmon fishery.—1. Regulation no. 1 in supplement no. 251-19-2, issued February 28, 1933, is amended to read as follows: Long Island, east of Dall Island: East and west coasts within 2,500 feet measured along the coast from 54 degrees 46 minutes 15 seconds north latitude.

2. Regulation no. 2 in supplement no. 251-19-2, issued February 28, 1933, permitting the operation of traps within 2,500 feet of a point on an unnamed island at 54 degrees 45 minutes 33 seconds north latitude, 132 degrees 22 minutes 17 seconds west longitude, and within 2,500 feet of the northwestern extremity of an unnamed island at 54 degrees 43 minutes 9 seconds north latitude, 132 degrees 19 minutes 17 seconds west longitude, is revoked.

Southeastern Alaska Area

Herring fishery.—Regulation no. 9 providing for a weekly closed period of 48 hours in certain waters of Chatham Strait and along the western coast of Baranof Island is revoked.

[*June 3, 1933*]

Alaska Peninsula Area

Salmon fishery.—Regulation no. 23 (*p*) is amended to read as follows: Korovin Island: Southeast coast within 5,200 feet easterly and northerly from a point at 55 degrees 22 minutes 45 seconds north latitude, 160 degrees 9 minutes 21 seconds west longitude.

Copper River Area

Salmon fishery.—Regulation no. 3 providing for a 12-hour weekly closed period from May 15 to July 5, in addition to the 36-hour weekly closed period prescribed by section 5 of the act of June 6, 1924, is hereby revoked.

Bering River Area

Salmon fishery.—Regulation no. 3 in supplement no. 251-19-4 issued March 7, 1933, providing for a 12-hour weekly closed period from June 1 to July 5, in addition to the 36-hour weekly closed period prescribed by section 5 of the act of June 6, 1924, is hereby revoked.

[*June 26, 1933*]

Cook Inlet Area

Salmon fishery.—Regulation no. 1 is hereby amended so that commercial fishing for salmon in Chinik Inlet, Kamishak Bay, may begin at 6 o'clock antemeridian June 27.

[*June 27, 1933*]

Kodiak Area

Salmon fishery.—1. Regulation no. 1 is amended to read as follows: The use of any floating trap for the capture of salmon is prohibited.

2. Commercial fishing for salmon by means of any purse seine more than 125 fathoms in length is prohibited.

3. Regulation no. 5 is amended so as to permit the use of not to exceed 50 yards of each set or anchored gill net as a hook.

4. Regulation no. 8 is amended so as to permit the use of purse seines within a line from Cape Trinity to Cape Alitak.

5. Regulation no. 12 is amended so as to permit the use of purse seines between Cape Karluk and Cape Uyak, and between Cape Uyak and Uyak post office.

6. Regulation no. 15 is amended so as to permit the use of purse seines on the north coast of Kodiak Island from Cape Karluk to Cape Uyak in the period from August 15 to August 31, both dates inclusive.

[*July 7, 1933*]

Bristol Bay Area

Salmon fishery.—1. In addition to existing prohibitions, commercial fishing for salmon in the Nushagak district, which embraces the waters of Nushagak Bay within a line from Point Protection to Etolin Point, is prohibited on Saturday of each week from 3:30 o'clock postmeridian to 6 o'clock postmeridian, in the period prior to 6 o'clock antemeridian August 3.

2. In addition to existing prohibitions, commercial fishing for salmon in the Ugashik district, which includes the coastal waters from a point 3 statute miles north of Cape Greig to a point on the coast 3 statute miles south of Cape Menshikof, is prohibited from 6 o'clock antemeridian Monday to 2 o'clock antemeridian Tuesday of each week, in the period prior to 6 o'clock antemeridian August 3.

[*July 10, 1933*]

Alaska Peninsula Area

Salmon fishery.—Regulation no. 2 in supplement no. 251–19–7, issued May 17, 1933, prohibiting the operation of a trap within 2,500 feet of a point in East Anchor Cove at 54 degrees 41 minutes 12 seconds north latitude, 163 degrees 3 minutes 36 seconds west longitude, is hereby revoked effective at noon on July 10.

[*July 12, 1933*]

Aleutian Islands Area

Herring fishery.—Regulation no. 1 in supplement no. 251–19–7, issued May 17, 1933, is amended to read as follows: Commercial fishing for herring, except for bait purposes, is prohibited from 6 o'clock postmeridian of Saturday of each week until 6 o'clock antemeridian of the Monday following.

Alaska Peninsula Area

Salmon fishery.—Regulation no. 7 is amended to read as follows: No stake gill net nor set or anchored gill net shall exceed 25 fathoms in length measured on the cork line, except that in the waters of the Shumagin Islands gill nets not to exceed 75 fathoms in length may be used.

[*July 19, 1933*]

Southeastern Alaska Area

WESTERN DISTRICT

Salmon fishery.—Regulation no. 3 in supplement no. 251–19–5, issued March 23, 1933, is amended, effective at 6 o'clock antemeridian July 21, 1933, to read as follows: Commercial fishing for salmon in Chilkat Inlet is prohibited north of a line from Green Point passing across the southern shore of Pyramid Island to the northern shore of Chilkat Inlet.

ICY STRAIT, WESTERN, EASTERN, SOUTH PRINCE OF WALES ISLAND, AND SOUTHERN DISTRICTS

Salmon fishery.—The regulations prohibiting commercial fishing for salmon by trolling from 6 o'clock antemeridian August 25 to 6 o'clock postmeridian September 20 are hereby revoked.

[*July 21, 1933*]

SOUTHEASTERN ALASKA AREA

NORTH PRINCE OF WALES ISLAND DISTRICT

Salmon fishery.—In addition to existing prohibitions, commercial fishing for salmon, except by trolling, is prohibited in all waters of Fools Inlet and Bradfield Canal east of a line extending from Point Warde cannery bluff to the point at the west side of the entrance to Fools Inlet in the period from 6 o'clock antemeridian July 21 to 6 o'clock postmeridian July 26.

[*July 25, 1933*]

PRINCE WILLIAM SOUND AREA

Salmon fishery.—In addition to existing prohibitions, all commercial fishing for salmon is prohibited in that part of Prince William Sound north of 60 degrees 37 minutes north latitude and west of 148 degrees west longitude after 12 o'clock midnight of July 27.

[*July 31, 1933*]

COOK INLET AREA

Salmon fishery.—Regulation no. 1 is amended so as to permit commercial fishing for salmon north of 60 degrees 50 minutes north latitude until 6 o'clock postmeridian August 4.

PRINCE WILLIAM SOUND AREA

Salmon fishery.—Regulation no. 10 is amended so as to permit (1) commercial fishing for salmon until 6 o'clock postmeridian August 4 except in the waters north of 60 degrees 37 minutes north latitude and west of 148 degrees west longitude where all commercial fishing for salmon is prohibited; (2) trolling and gill netting through August 22 in the waters along the western coast from the outer point on the north shore of Granite Bay (known as Granite Bay Point) to the light on the south shore of the entrance to Port Nellie Juan; and (3) the operation of set or anchored gill nets in the period from 6 o'clock antemeridian August 2 to 6 o'clock postmeridian September 20 in the waters of Valdez Arm east of 146 degrees 25 minutes west longitude. All trap leads from shore to entrance of hearts must be removed prior to 6 o'clock antemeridian August 9.

SOUTHEASTERN ALASKA AREA

ICY STRAIT DISTRICT

Salmon fishery.—Regulation no. 6 is amended so as to permit commercial fishing for salmon until 6 o'clock postmeridian August 6.

[*August 2, 1933*]

SOUTHEASTERN ALASKA AREA

NORTH PRINCE OF WALES ISLAND DISTRICT

Salmon fishery.—Regulation no. 18 (*p*) prohibiting all commercial fishing for salmon in Olive Cove, indenting the northeastern shore of Etolin Island, is hereby revoked.

[*August 5, 1933*]

SOUTHEASTERN ALASKA AREA

ICY STRAIT DISTRICT

Salmon fishery.—Regulation no. 1 in supplement no. 251-19-17, issued July 31, 1933, is amended so as to permit commercial fishing for salmon until 6 o'clock postmeridian August 10.

[*August 9, 1933*]

SOUTHEASTERN ALASKA AREA

WESTERN DISTRICT

Salmon fishery.—1. Regulations nos. 6 and 7 are amended so as to permit commercial fishing for salmon until 6 o'clock postmeridian August 19.

2. Regulation no. 9 is amended so as to permit commercial fishing for salmon by means of traps until 6 o'clock postmeridian August 19.

NORTH PRINCE OF WALES ISLAND DISTRICT

Salmon fishery.—In addition to existing prohibitions, commercial fishing for salmon, except by trolling, is prohibited in all waters of Fools Inlet and Bradfield Canal east of a line extending from Point Warde cannery bluff to the point at the west side of the entrance to Fools Inlet.

[*August 10, 1933*]

KODIAK AREA

Salmon fishery.—Regulation no. 15 is amended so as to permit commercial fishing for salmon in Alitak Bay and all its branches until 6 o'clock postmeridian August 25, and from 6 o'clock antemeridian September 5 through September 30. All commercial fishing for salmon in Alitak Bay and all its branches is prohibited from 6 o'clock postmeridian August 25 to 6 o'clock antemeridian September 5.

[*August 15, 1933*]

SOUTHEASTERN ALASKA AREA

EASTERN DISTRICT

Salmon fishery.—1. Regulation no. 7 is amended so as to permit commercial fishing for salmon until 6 o'clock postmeridian August 19.

2. Regulation no. 9 is amended so as to permit commercial fishing for salmon by means of traps until 6 o'clock postmeridian August 19.

[*August 17, 1933*]

SOUTHEASTERN ALASKA AREA

SOUTHERN DISTRICT

Salmon fishery.—1. Regulation no. 6 is amended so as to permit commercial fishing for salmon until 6 o'clock postmeridian August 22.

2. Regulation no. 8 is amended so as to permit commercial fishing for salmon by means of traps until 6 o'clock postmeridian August 22.

[*August 21, 1933*]

SOUTHEASTERN ALASKA AREA

WESTERN DISTRICT

Salmon fishery.—1. Regulations nos. 6 and 7, as modified by supplement no. 251–19–20, issued August 9, 1933, are amended so as to permit commercial fishing for salmon until 6 o'clock postmeridian August 22.

2. Regulation no. 9, as modified by supplement no. 251–19–20, issued August 9, 1933, is amended so as to permit commercial fishing for salmon by means of traps until 6 o'clock postmeridian August 22.

EASTERN DISTRICT

Salmon fishery.—1. Regulation no. 7, as modified by supplement no. 251–19–22, issued August 15, 1933, is amended so as to permit commercial fishing for salmon until 6 o'clock postmeridian August 23, and to permit commercial fishing for salmon by means of drift gill nets in Taku Inlet from 6 o'clock antemeridian September 5 to 6 o'clock postmeridian September 30.

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2. Regulation no. 9, as modified by supplement no. 251-19-22, issued August 15, 1933, is amended so as to permit commercial fishing for salmon by means of traps until 6 o'clock postmeridian August 23.

ALL AREAS

Herring fishery.—The dumping of offal and dead herring in the waters of any bay in which herring spawn is prohibited.

[*August 22, 1933*]

SOUTHEASTERN ALASKA AREA

NORTH PRINCE OF WALES ISLAND DISTRICT

Salmon fishery.—1. Regulation no. 6 is amended so as to permit commercial fishing for salmon until 6 o'clock postmeridian August 26.

2. Regulation no. 7 is amended so as to permit commercial fishing for salmon by means of traps until 6 o'clock postmeridian August 26.

[*August 26, 1933*]

CHIGNIK AREA

Salmon fishery.—Regulation no. 12 is amended so as to prohibit all commercial fishing for salmon after 6 o'clock postmeridian August 26.

SOUTHEASTERN ALASKA AREA

NORTH PRINCE OF WALES ISLAND DISTRICT

Salmon fishery.—1. Regulation no. 6, as modified by supplement no. 251-19-25, issued August 22, 1933, is amended so as to permit commercial fishing for salmon until 6 o'clock postmeridian August 29.

2. Regulation no. 7, as modified by supplement no. 251-19-25, issued August 22, 1933, is amended so as to permit commercial fishing for salmon by means of traps until 6 o'clock postmeridian August 29.

SOUTH PRINCE OF WALES ISLAND DISTRICT

Salmon fishery.—1. Regulation no. 6 is amended so as to permit commercial fishing for salmon until 6 o'clock postmeridian August 31.

2. Regulation no. 8 is amended so as to permit commercial fishing for salmon by means of traps until 6 o'clock postmeridian August 31.

[*August 31, 1933*]

SOUTHEASTERN ALASKA AREA

SOUTH PRINCE OF WALES ISLAND DISTRICT

Salmon fishery.—1. Regulation no. 6, as modified by supplement no. 251-19-26, issued August 26, 1933, is amended so as to permit commercial fishing for salmon until 6 o'clock postmeridian September 2.

2. Regulation no. 8, as modified by supplement no. 251-19-26, issued August 26, 1933, is amended so as to permit commercial fishing for salmon by means of traps until 6 o'clock postmeridian September 2.

Revised regulations covering the fisheries of Alaska were issued by the Secretary of Commerce under date of December 21, 1933, copies of which may be secured, without cost, on application to the Bureau of Fisheries, Washington, D.C.

ANNETTE ISLAND FISHERY RESERVE

The lease of the fishing and canning privileges of the Annette Island Fishery Reserve by the Annette Island Packing Co. under contract dated February 25, 1928, expired on December 1, 1932, and the cannery was again offered to competitive bidders.

On April 4, 1933, the First Assistant Secretary of the Interior on behalf of the inhabitants of the reserve entered into a contract, effective on that date, with W. A. Pries, of Ketchikan, for the lease of the cannery for 5 years. Under the terms of this contract the lessee operates the cannery in consideration of one-half of the net profits, with a guarantee of a minimum annual payment of $3,000 to the lessor, regardless of the amount of profits made, and with the further provision that all net profits in excess of $25,000 for 1 year shall be prorated upon the basis of 55 percent to the lessor and 45 percent to the lessee.

In accordance with a provision of the contract, Mr. Pries organized a corporation, known as the Annette Island Canning Co., for the purpose of carrying out the terms of the agreement.

In 1933 the company operated 6 traps within the reservation, the catch of which totaled 552,192 salmon, and 10,271 salmon taken in purse seines and gill nets were purchased from the natives. In addition, 556,483 salmon were purchased from independent operators of traps and seines outside the reserve and packed at the cannery. In the operation of the cannery and of the fish traps employment was given to 25 whites, 154 natives, and 1 Filipino.

STREAM IMPROVEMENT

As in previous years, Bureau employees in the course of their regular patrol duties removed log jams and other obstructions in salmon streams from time to time, in order to enable the salmon to reach the spawning beds. Attention was given also to the destruction of predatory trout, particularly in the Bristol Bay and Kodiak Island regions. The work of stream improvement in general, however, was greatly curtailed this season, as the field force was small because of the limitation of funds.

An appropriation of $15,000 was made by the Territorial Legislature in 1933 to be expended during the next biennium for the destruction of predatory enemies of salmon, which has enabled a more active prosecution of this work in the winter of 1933–34.

STREAM MARKING

New markers defining areas closed to commercial fishing were erected to replace those which had become illegible or damaged, and changes were made in the positions of others to conform with changes made in the regulations with respect to closed areas.

STREAM GUARDS

The Bureau employed 131 men in 1933 as stream guards and special workmen in connection with law-enforcement duties. Of these, 56 were stationed in southeastern Alaska, 50 in central, and 25 in western Alaska. Not only was the number of persons employed considerably less than in previous years, but the period of employment was greatly curtailed, the average for all temporary workers being less than 2 months.

In southeastern Alaska 22 stream watchmen furnished their own launches and were assigned to patrol larger bodies of water or in the vicinity of several streams.

In central Alaska 21 guards were stationed in the Seward-Katalla district, 8 on Cook Inlet, 14 in the Kodiak-Afognak district, 2 at Chignik, and 5 in the Ikatan-Shumagin district. Twenty of these guards, most of whom were in the Seward-Katalla district, provided their own launches.

In western Alaska 23 were on Bristol Bay and 2 in the Yukon-Kuskokwim district.

There were also 5 special employees engaged in scientific work—2 on herring and 3 on salmon investigations, this work being carried on in southeastern and central Alaska.

In addition there were 12 statutory employees, 53 men on the Bureau's vessels, and 2 on the 2 chartered boats.

The foregoing makes a grand total of 203 persons identified with fishery-protective work in Alaska in 1933, as compared with 290 in 1932.

VESSEL PATROL

Fourteen vessels owned by the Bureau were engaged in fishery-patrol work in Alaska in 1933. Of these the *Widgeon*, *Murre*, *Auklet*, and *Petrel* were used in southeast Alaska; the *Kittiwake* in the Seward-Katalla district; the *Blue Wing* and *Red Wing* in the Kodiak-Afognak area; the *Ibis* at Chignik; the *Scoter* on Bristol Bay; and the *Coot* on the Yukon River. The *Eider* and *Crane* patrolled the Alaska Peninsula area, and both assisted in the transportation of Bureau employees and supplies between Seattle and Bristol Bay. The *Crane* also participated in the fishery patrol and stream inspection in southeast Alaska during the fall season. The *Teal* was again on duty at Cook Inlet until the middle of August and later assisted with the patrol in southeast Alaska.

The *Brant* was used chiefly in general supervisory work, visiting all fishing areas as far westward as Bristol Bay in June and July. During the remainder of the season it cruised in southeast Alaska, assisting with the patrol and stream survey work. The *Puffin*, which had been on patrol duty in the vicinity of Ketchikan in 1932, was laid up at Seattle throughout the year.

Three speed boats, each equipped with an 82-horsepower Chrysler motor, were built by the Bureau in the spring of 1933 and were used in the fisheries patrol in Alaska during the season—1 at Yakutat, 1 on Copper River and Prince William Sound, and 1 in Bristol Bay. Five other small patrol boats were also operated by the Bureau in the Bristol Bay area.

In addition to the vessels owned by the Bureau of Fisheries, two vessels were chartered for patrolling fishing areas—the *Sterling* in the Ketchikan region, and the *Katherine L* on Copper River and Prince William Sound. A chartered launch, the *Marie S*, was used on the Kuskokwim River.

COMPLAINTS AND PROSECUTIONS

In southeastern Alaska a floating trap of the Independent Salmon Canneries, Inc., was seized on July 23 for fishing during the weekly closed period. When the case was brought before the United States Commissioner's Court at Juneau, the agent of the company pleaded guilty to illegal fishing, and a fine of $100 was assessed. Upon payment of the fine and costs, the trap was released.

A floating trap of the Alaska Pacific Salmon Corporation was seized for not having the tunnel properly closed and the spillers raised to within 4 feet of the surface during the closed period before the beginning of the salmon fishing season. Condemnation proceedings were filed at the Commissioner's Court at Juneau, but on recommendation of the United States attorney they were dismissed.

Five seine boats in southeastern Alaska, the *John Quenette*, *Teaser*, *Bernice*, *Collette*, and *Cedric*, were seized for illegal fishing in closed waters. Pleas of guilty were entered by the defendants in each case, and fines were imposed, ranging from $50 to $375 for the several boats and aggregating $1,250, exclusive of costs. The operator of the gas boat *Norma Jane* was fined $75 and costs of $29.75 for using a beach seine in Smeaton Bay, in which locality this type of gear is prohibited.

In the Seward-Katalla district a trap belonging to William King and W. J. Crooker was seized because it was not constructed so as to prevent the capture of salmon during the closed period, and the defendants paid a fine of $200. In this area, also, a fisherman was fined $25, including costs, for taking undersized razor clams, and another was given a 20-day suspended sentence for using an anchored gill net in the Copper River region, where only drift gill nets are permitted. The clams and salmon illegally taken were confiscated and sold, the proceeds being turned over to the Department of Justice.

A 78-fathom gill net, of which 15 fathoms were used as a hook, was operated by Harry W. Crosby off the shore of Chignik Island in violation of the regulation which limited the length of anchored gill nets in this area to 25 fathoms, of which not more than 12 fathoms might be used as a hook. The net and a skiff were seized, and the salmon were confiscated and sold for the account of the Government. At the close of the year the case was still pending.

Two gill-net boats of the Alaska Packers Association were found violating the regulations in the Bristol Bay area, the *R–49* off the Naknek River with net in the water a half-hour after the beginning of a weekly closed period, and boat *No. 38* above the markers in upper Kvichak Bay. Hearings were held before the local commissioner and in view of extenuating circumstances the men, boats, and gear were released.

TERRITORIAL FISHERY LEGISLATION

At its biennial session in 1933 the Legislature of Alaska passed 6 acts which have reference to the fisheries of the Territory.

Appropriations for the payment of bounty on hair seals, which are destructive to salmon and other fishes in certain localities, were made in 2 acts, 1 of which included also an appropriation of $15,000 for the improvement of salmon spawning streams and the destruction of predatory enemies of salmon.

An act was passed repealing chapter 95 of the laws of 1923, which provided for closed seasons on salmon fishing in southeast Alaska in addition to the restrictions imposed by regulations of the Department of Commerce.

The law of 1927 relative to a tax of one-tenth of 1 cent per pound on fresh fish purchased by fish dealers was amended to make the tax applicable only to such fish purchased in excess of 400,000 pounds.

An act was passed to amend and codify the laws of the Territory providing for liens of cannery and saltery workers and fishermen.

An act approved April 20, 1933, repealed legislation of 1923, 1925, and 1929 with respect to the licensing of fishermen, and made operative license fees of $1 for each resident fisherman and $25 for each nonresident fisherman. The validity of this act has been questioned, and pending the court's final decision in the case nonresident fishermen have been paying the fee under protest in order that they may recover if the law is held invalid.

TERRITORIAL LICENSE TAX

Fisheries license taxes were collected by the Territory under the General Revenue Law of 1921, as amended in subsequent sessions of the Territorial Legislature. A statement from W. G. Smith, Territorial treasurer, under date of May 11, 1934, gives the collections made to that date for the year 1933. It was stated that collections under the several schedules were fairly complete, although a number of the fisheries companies had not yet made full settlement. The outstanding salmon pack taxes amounted to approximately $50,000 and about $5,000 was still due on fish traps, while $4,400 was still to be collected on fish oil and fertilizer, and $3,300 under the whale oil and fertilizer schedule.

Fishery license taxes collected by Territory for fiscal year ended Dec. 31, 1933

Schedule	Division no. 1	Division no. 2	Division no. 3	Total
Salmon canneries (pack)	$83, 188. 65		$453, 996. 71	$537, 185. 36
Clam canneries			394. 71	394. 71
Salteries	2, 314. 09	$73. 89	2, 630. 99	5, 018. 97
Cold-storage plants	700. 00			700. 00
Fish-oil works and fertilizer and fish-meal plants	20, 739. 11		4, 559. 87	25, 298. 98
Fish traps	68, 969. 19		45, 323. 74	114, 292. 93
Gill nets	340. 50	23. 00	3, 793. 00	4, 156. 50
Seines	3, 010. 00		1, 840. 00	4, 850. 00
Total	179, 261. 54	96. 89	512, 539. 02	691, 897. 45
Salmon canneries (net income), not possible of segregation as to judicial division				12, 874. 35
Total collections				704, 771. 80

WATER-POWER PROJECTS IN ALASKA

An application for a license for a minor power project at New Port Walter on the east side of Baranof Island was referred to the Bureau by the Federal Power Commission for report as to whether any special conditions for the protection of migratory fish should be imposed in the license, if issued. As the stream in question is not used by spawning salmon, the Commission was notified that no such special conditions would be necessary.

The Federal Power Commission also asked for a report of the effect on fish migration of the existing and former structures constituting a part of the power project constructed by the Kasaan Gold Co. on Harris Creek, a tributary of Kasaan Bay, and requested recommendations for such conditions as should be imposed on the licensee in the event that the project should be rebuilt. The Commission was advised that the Bureau's field agent at Ketchikan reported that the creek was not obstructed by the dam of the Kasaan Gold Co. in its present state of disrepair. Recommendation was made that if the project were rehabilitated the company be required to install a fish ladder at a specified place in order that a constant flow of water might be assured.

KUSKOKWIM RIVER

From June 4 to July 29 Stream Guard Charles McGonagall patrolled the Kuskokwim River area, using a chartered launch. During that time no heavy runs of salmon were observed, and there were no large catches. The best catches were made with drift nets at night. There was no rain in June and July and the river was clear, which undoubtedly accounted for the fact that few fish were taken in gill nets and fish wheels. No fishing for export was carried on in this district in 1933. Two hundred and eighty-six natives fished in the river for local requirements, using 509 gill nets of 7,630 fathoms, 38 wheels, and a number of small boats. They prepared 282 tons of dried chums.

YUKON RIVER

Two operators engaged in commercial fishing in the Yukon River area in 1933, their products for the outside market amounting to 132 tierces of mild-cured kings and 72 barrels of pickled kings.

A patrol of the district was again maintained by Inspector C. F. Townsend and a stream guard with the *Coot*, which left the Government ways at Nenana on May 23 for the mouth of the Yukon. The river was then at a very low stage for the time of year, no doubt because the snowfall in the interior of Alaska had been light during the winter. The ice was late in breaking up, and it was necessary for the vessel to wait some time at Shageluk Slough for the river to clear. Hamilton was reached on June 3.

Ice was piled up off the different mouths of the river until June 16, and the salmon runs were unusually late in arriving. The first king salmon, badly bruised and cut by the ice, were caught on June 14. The big run started 3 days later and continued through the month. The run of chums started on June 20. Catches were heavy in the lower river reaches, but above Mountain Village they were the lightest for years, due no doubt to the low stage of the river throughout June and July. Reports indicate that the September run was fair. Also a good supply of dried dog feed had been carried over from the previous season, thus avoiding any shortage for the needs of the district during the winter.

Products of the Yukon and Tanana fisheries, including the commercial output, were as follows: 138 cases of kings canned and 528 pounds of canned smoked kings, 132 tierces of mild-cured kings, 19,400 pounds of kings and 2,400 pounds of chums pickled, and 392 tons of dried chums. Apparatus consisted of 242 wheels, 130 gill nets of 1,668 fathoms, 1 motor vessel of 50 tons, 3 launches, 1 scow, and miscellaneous small boats. There were 13 whites and 344 natives engaged in the fishery.

WEIRS FOR COUNTING SALMON ESCAPEMENT

A lack of funds prevented the operation in 1933 of many of the weirs previously established for counting the escapement of spawning fish in typical salmon streams of Alaska as a means of determining the ratio of escapement to catch. The weirs at Karluk, Chignik, and Olive Cove, however, were again operated in order that further data might be obtained in regard to the runs in these localities, where the Bureau has for a number of years specialized in scientific studies of the life history and habits of the salmon. One weir was continued also in Cook Inlet, and in the Alitak Bay district a count was made at the cannery station during part of the season.

Reports of operations of the weirs and of the counts of salmon in 1933 are as follows:

OLIVE COVE

Construction of the Olive Cove weir and of a special inclosure to hold fish for scientific study was begun on June 7 and completed on June 12. Pink salmon began to appear at the mouth of the creek on July 6, and on July 12 a few were below the first falls. The first count was on July 15, and the peak of the run occurred on July 21, on which date 13,527 pink salmon passed through the weir. Counting was continued to August 24, when the total escapement numbered 133,081 pink salmon, 107 chums, and 51 cohos. It was estimated that approximately 7,000 spawning fish were in the stream below the weir at the time the structure was removed. Walter Campen was in charge of the work at this place, under the supervision of Assistant Agent S. A. Baker.

KARLUK RIVER

The Karluk weir was completed on May 14, and the first count was made on May 16, when a few king salmon passed upstream. Red salmon began to appear on May 21, but it was not until June 2 that any appreciable numbers were tallied. Although the weir count to June 1 was small, there were large numbers of salmon in the closed waters of the lagoon ready to ascend to the spawning beds; therefore, the opening of the fishing season was not postponed until a later date. Good catches were made throughout June, with the result that the total catch exceeded the weir escapement; therefore, the Karluk area was closed from 6 o'clock postmeridian July 1 until 6 o'clock antemeridian July 10. The reopening of the district to commercial fishing on the latter date was in order that the fishermen might take advantage of the increasing run of pink salmon. It became necessary, however, to close the section between Cape Karluk and Cape Uyak on July 29 and the entire Karluk area on August 19, and the only additional fishing permitted during the season was for the week from September 11 to 16.

The total count of salmon through the weir from May 16 to October 9, inclusive, was 986,765 reds, 107,663 pinks, 12,824 cohos, and 8,107 kings. The reported commercial catch of red salmon from Cape Karluk to West Point was 842,733, indicating that 46 percent of the Karluk run was caught and 54 percent escaped to the spawning grounds.

Before the seaward migration of young red salmon began in the spring a considerable number of predatory trout were caught by traps and seines. Forty thousand red-salmon fingerlings were marked at Karluk Lake in May and June.

Charles P. Turner was in charge of this weir, under the direction of Warden Howard H. Hungerford.

CHIGNIK RIVER

The site of the Chignik weir was approximately 30 feet below that used in the previous year, where the river is about 455 feet wide and from 2 to 4½ feet deep. Construction began on April 25 and was completed on May 25. The first salmon passed upstream on June 6, and counting was continued through June 24, when 104,565 red salmon had been tallied. As a result of heavy rains which began on June 20, the river rose rapidly and the gravel at the bottom was washed away, causing the weir to sag and finally, on the morning of June 25, to break down so that the salmon could pass through. By July 17 the river had dropped 1 foot, and an attempt was then made to repair the weir, but it was unsuccessful.

The run of red salmon, which reached its peak during the week ending July 1, was light throughout the season. The reported catch of reds was 541,678, and it was estimated that 534,660 escaped to the spawning grounds. The run of chum salmon was the largest since 1929, the pink salmon run was good for an off year, and the coho run was fair. Warden Charles Petry was in charge of the Bureau's work at this place.

CHINIK CREEK

A weir was placed in Chinik Creek, Kamishak Bay, on the site formerly used, and from June 28 to July 25, inclusive, 39,222 red salmon were counted. Frank West, stream watchman in the district, performed the weir work under the direction of Capt. R. L. Cole.

ALITAK BAY

The cannery station weir on Olga Bay, in the Alitak Bay region, was installed for the purpose of catching predatory trout in the spring and was operated for a number of weeks thereafter in counting the salmon escapement. From May 23 to August 26 there were counted 90,448 red salmon. As this stream normally receives about 25 percent of the run into Olga Bay, it is estimated that at least 300,000 red salmon entered the Olga Bay tributaries. The total reported catch of red salmon in the district was 168,540.

Henry B. Looff conducted operations here under the supervision of Warden Howard H. Hungerford.

SALMON LIFE-HISTORY STUDIES

Studies of the biology of the Alaska salmon were continued in 1933 by the staff of investigators of the Fisheries Biological Station at Seattle, Wash. Two major investigations dealing with the red salmon, at Karluk and Chignik, and one pertaining to the pink salmon in southeastern Alaska were in progress during the year.

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The principal objective of the red-salmon investigations is to determine the number of fish that should be permitted to spawn in order to produce the greatest surplus for the commercial fishery in succeeding generations. To further this study additional marking experiments were undertaken in which small seaward migrating salmon were marked for future identification by removal of certain fins. The investigation at Karluk was directed by Joseph T. Barnaby, and that at Chignik by Harlan B. Holmes.

Under the direction of Dr. Frederick A. Davidson, racial characteristics of pink salmon have been studied in southeastern Alaska for a period of 4 years, or two life cycles of this species. Preliminary analysis of the data collected points to racially distinct populations in each stream, and to distinct populations in the same stream in odd and even years. In addition to this primary phase of the pink salmon investigation, studies of the seasonal change in the quality of pink salmon have been undertaken in cooperation with the National Canners Association. Complete reports of these investigations are published in another document.

OBSERVATIONS ON THE ESCAPEMENT OF SALMON

Field employees kept in close touch with the progress of the salmon runs throughout the season in all districts for the purpose of regulating commercial fishing operations. At the close of the fishing season some of the representative salmon streams were visited to observe conditions on the spawning beds.

Southeast Alaska.—Throughout all southeastern Alaska the runs of pink salmon were late, and the fish were of small size. In the north Prince of Wales Island and southern districts the catch of this species was negligible prior to July 15, but after that date and until the end of the season the runs increased and some good catches were made. There was little escapement of pink salmon in the southern district until after the close of commercial fishing, and the late runs resulted only in irregular seeding of the spawning beds. Some streams appeared to be adequately seeded, while others received so few spawning fish as to endanger the runs. In the north Prince of Wales Island district the escapement was more satisfactory, although not as large as in other recent years. The escapement in this district was regarded as fair.

The pink salmon runs in all parts of the south Prince of Wales Island district were smaller than they have been for several years. They improved somewhat toward the end of the season and provided an adequate supply of spawning fish in a number of streams, but, as in the north Prince of Wales Island and southern districts, the escapement was very irregular, and streams tributary to Sea Otter Sound and Tuxekan Passage were found to have less than half of the normal seeding. Conditions in the streams of this district were particularly favorable this year, and it seems probable that a good return may result from this comparatively poor escapement. The red salmon run in this district was comparable to that of the two previous years, in which satisfactory increases had been noted. The chum and coho runs were also satisfactory.

In the Icy Strait, western and eastern districts the pink salmon did not appear in numbers until much later than usual. In the Icy

Strait district this species appeared late in June, in the western district about July 20, and in the eastern district about August 5. These runs appeared to be numerically as strong as in 1932, but the individuals were of very small size. The pink salmon escapement in these districts was below normal. The runs of reds and chums were smaller than usual, and the escapement of these species was correspondingly light.

In the Yakutat district the runs of all species were generally below average. The escapements of reds to Lost River, Situk River, Ahrnklin River, and Italio River were good, and fair escapements of other species were obtained.

Prince William Sound and Copper River region.—The pink salmon runs in Prince William Sound were smaller than usual and because of the exceptionally dry weather and lack of water in the streams very few fish reached the spawning grounds prior to the close of commercial operations. From an inspection of some of the streams in this region it was concluded that the spawning gravels were fairly well seeded except in the streams along the northwestern coast, including Port Wells. There was a good escapement of red salmon to Eshamy River, and also to Eyak and Copper Rivers, but the runs of this species to Bering River were a failure. The escapement of cohos was believed to be satisfactory.

Cook Inlet.—The escapement of red salmon was very large in the more important spawning grounds of Cook Inlet. Large numbers were observed especially in the Kenai and Kasilof River systems, and on the Fish Creek gravels. Inadequate escapements were reported for Cottonwood Creek and English Bay and Kalgin Island streams. The escapements into Chinik Creek and Susitna River were considered satisfactory. The run of pink salmon was not large, but was of sufficient size to adequately seed the streams of this region as few of the fish were taken for commercial purposes.

Kodiak area.—Pink salmon were abundant in all streams of this region except those in Alitak Bay where the run was unusually light. The red salmon runs were good in the early part of the summer but were of short duration. The escapement of this species was below average throughout the district, and especially in Karluk River, where the run was small. The run of chum salmon was much below normal and resulted in a proportionately small escapement. The coho run was about two weeks later than usual but a good escapement was obtained.

Chignik.—The red salmon run and escapement at Chignik was one of the poorest on record, the total run being estimated at slightly more than a million fish. Of this number it was estimated that about 535,000 were reserved for spawning purposes. Most of the streams in the Chignik region had a fair escapement of other species.

Alaska Peninsula.—A good escapement of pinks and chums occurred in practically all streams on the south side of the Alaska Peninsula. Particularly good escapements of these species were noted in streams tributary to Ikatan and Morzhovoi Bays. In general, the escapement of red salmon was below normal, although spawning grounds in Thin Point, Mortensen, and Kinzarof Lagoons appeared to be well seeded.

Bristol Bay.—The red salmon run in Bristol Bay was one of the largest on record and the escapements in Kvichak, Naknek, and

Egegik Rivers were very large. Subsequent observations at Lake Iliamna and Lake Clark indicated that the fish were well distributed on the spawning grounds. The run of reds in Nushagak Bay was light and the escapement was considerably below normal. The run of this species in Ugashik River also was light, but it is believed that an escapement of approximately 50 percent of the run was obtained.

HATCHERIES

EXTENT OF OPERATIONS

The operation of the Government's hatcheries at Afognak and McDonald Lake was discontinued after the young salmon hatched from eggs taken in the preceding year had been liberated. At the privately owned hatchery on Hugh Smith Lake salmon propagation was carried on throughout the year. This hatchery was taken over by the Pacific American Fisheries when it leased the properties of the Northwestern Fisheries Co. in Alaska in the spring of 1933.

From the Afognak hatchery there were released in near-by lakes during the months from March to June, inclusive, 17,400,000 red-salmon fry that had been produced from the 19,151,800 eggs collected in 1932. A shipment of 154,000 eyed Dolly Varden trout eggs was forwarded from this hatchery to the Bureau at Seattle in February.

Of the 25,500,000 red-salmon eggs that were collected at the McDonald Lake hatchery in 1932, 3,010,650 in the eyed stage were shipped to Seattle in October of that year. From the remainder there were produced and liberated into Lake McDonald 2,480,000 advanced fry and 14,073,000 no. 2 fingerlings, the former being released in May and the latter in July. There were also released into Lake McDonald in March 153,900 pink-salmon fry, produced from eggs collected at this hatchery in 1932.

The private hatchery at Hugh Smith Lake produced and liberated in Alaska waters 22,173,950 red-salmon fry from the 25,895,000 eggs collected in 1932. A collection of 20,650,000 red-salmon eggs was made at this hatchery in 1933.

Operations of Federal and private hatcheries in Alaska in 1933

Location of hatchery	Red or sockeye salmon		
	Eggs taken in 1932	Salmon liberated in 1933	Eggs taken in 1933
Afognak	19, 151, 800	17, 400, 000	
McDonald Lake	25, 500, 000	16, 553, 000	
Hugh Smith Lake (Quadra)	25, 895, 000	22, 173, 950	20, 650, 000
Total	70, 546, 800	56, 126, 950	20, 650, 000

HATCHERY REBATES

The owners of private salmon hatcheries in Alaska who are also packers of canned salmon receive a rebate on license fees and taxes of every nature on their catch and pack of salmon at the rate of 40 cents per 1,000 king- or red-salmon fry liberated by them in Alaska waters. In the fiscal year ended June 30, 1933, only one such private salmon hatchery was operated—that of the Northwestern Fisheries Co. at Hugh Smith Lake—and the rebate due on the 22,173,950 red-salmon fry liberated there during the year amounted to $8,869.

GENERAL STATISTICS OF THE FISHERIES

The total number of persons engaged in the fisheries of Alaska in 1933 was 21,695, or 1,573 more than in 1932. Fishery products were valued at $32,126,588, an increase of $7,097,668, or 28 percent over the preceding year. Of the total amount, 91.5 percent represented the value of salmon products; 4.4 percent herring; 2.3 percent halibut; and 1.8 percent the value of all other fishery products.

SALMON

An outstanding feature of the salmon runs in Alaska in 1933 was the unusual abundance of red salmon in the Bristol Bay region, particularly in the Kvichak-Naknek section. Although the fish were of smaller size than they are in some years, they were present in such enormous numbers that a larger pack was put up in the western district than for any previous year except 1918. Most of the packers had filled all their cans and discontinued operations before the close of the fishing season.

In the various red-salmon regions of central Alaska the runs in general were fair, while in southeast Alaska the number of red salmon was considerably below average. The runs of the other species of salmon throughout the Territory as a whole were about normal.

The total catch of salmon increased approximately 8 percent over that for 1932. By districts, southeastern Alaska and western Alaska showed gains of 4 percent and 28 percent, respectively, while in central Alaska the catch decreased about 2 percent.

There was an increase of 37 percent for the whole of Alaska in the number of fathoms of seines used, 13 percent in the number of fathoms of gill nets, and about 17 percent in the number of traps, as compared with those in operation in 1932.

CATCH AND APPARATUS

The total number of seines used in the salmon industry in 1933 was 491, of which 389 were purse seines and 102 beach seines. The purse seines aggregated 59,345 fathoms of webbing, and the beach seines 10,102 fathoms. The number of gill nets used was 3,282, having a total length of 223,660 fathoms. There were 139 driven and 261 floating traps—a total of 400.

Southeastern Alaska was accredited with 324 seines, or a total of 52,275 fathoms, an increase of 131 seines and 17,820 fathoms of webbing from the number used in 1932; also with 265 gill nets, aggregating 24,625 fathoms, an increase of 107 nets and 12,500 fathoms of webbing; and with 19 driven and 242 floating traps, a decrease of 3 driven and an increase of 71 floating traps, as compared with the number operated in 1932.

Corresponding figures for central Alaska show 158 seines, or 15,632 fathoms, as compared with 134 seines, or 15,520 fathoms, in 1932;

Summary of persons engaged and products of the Alaska fisheries in 1933

Items	Southeast Alaska		Central Alaska		Western Alaska		Total	
	Number	Value	Number	Value	Number	Value	Number	Value
PERSONS ENGAGED								
Whites	4,504		3,181		3,674		11,359	
Natives	3,133		1,182		1,247		5,562	
Chinese	91		157		349		597	
Japanese	441		226		302		969	
Filipinos	963		661		590		2,214	
Mexicans	8		4		893		905	
Negroes	2				55		57	
Miscellaneous	16		3		13		32	
Total	9,158		5,414		7,123		21,695	
PRODUCTS								
Salmon:								
Canned ... cases	2,087,951	$9,598,789	1,485,994	$7,859,158	1,651,659	$10,918,067	5,225,604	$28,376,014
Mild cured ... pounds	3,817,600	612,393			105,600	10,435	3,923,200	622,828
Pickled ... do	14,000	926	342,450	27,108	678,500	45,886	1,034,950	73,920
Fresh, for food ... do	559,287	30,601					559,287	30,601
Frozen, for food ... do	4,236,252	221,382					4,236,252	221,382
Fresh, for halibut bait ... do	48,700	277	15,300	100			64,000	377
Dry-salted and dried ... do			31,425	641	1,368,107	54,640	1,399,532	55,281
Smoked and canned ... cases	100	520	334	2,647	16	75	450	3,242
Fertilizer ... pounds	600,000	9,900	313,358	4,779			913,358	14,679
Oil ... gallons	20,000	3,000	15,700	2,748			35,700	5,748
Halibut:								
Fresh ... pounds	8,260,476	415,833	22,061	1,790			8,282,537	417,623
Frozen ... do	5,786,374	308,739					5,786,374	308,739
Herring:								
Fresh, for bait ... do	2,413,220	21,232	562,300	5,014			2,975,520	26,246
Frozen, for bait ... do	1,496,370	12,263					1,496,370	12,263
Pickled, for food:								
Scotch cure ... do	3,874,703	174,284	7,177,000	338,065	1,599,625	73,982	12,651,328	586,331
Norwegian cure ... do	31,250	1,750	6,000	450	253,700	11,819	290,950	14,019
Roused, for food (bloater stock) ... do					509,790	17,474	509,790	17,474
Spiced ... do	1,000	125					1,000	125
Dry-salted ... do					54,200	2,020	54,200	2,020
Meal ... do	17,534,860	277,611	4,496,000	71,911			22,030,860	349,522
Oil ... gallons	2,509,573	318,797	595,248	75,397			3,104,821	394,194

Cod:								
Dry-salted..........pounds..	--------	--------	36,620	1,667	45,810	1,350	82,430	2,417
Pickled..........do....	--------	--------	186,425	5,865	38,000	1,500	224,425	7,365
Stockfish..........do....	--------	--------	28,220	2,785	3,000	300	31,220	3,085
Tongues..........do....	--------	--------	400	40	--------	--------	400	40
Whale:								
Oil..........gallons..	--------	--------	301,350	53,066	--------	--------	301,350	53,066
Sperm oil..........do....	--------	--------	11,200	2,150	--------	--------	11,200	2,150
Fertilizer..........pounds..	--------	--------	1,034,000	13,773	--------	--------	1,034,000	13,773
Clams:								
Canned..........cases..	83	361	40,331	245,952	--------	--------	40,414	246,313
Whole in shell..........dozen..	--------	--------	50	25	--------	--------	50	25
Crabs:								
Canned..........cases..	4,644	39,743	11,470	94,587	--------	--------	16,114	134,330
Meat..........pounds..	62,968	15,923	27,392	3,711	--------	--------	90,360	19,634
Whole in shell..........dozen..	1,056	665	807	951	--------	--------	1,863	1,616
Shrimp:								
Meat..........pounds..	307,552	100,109	9,460	1,992	--------	--------	317,012	102,101
Whole in shell..........do....	1,540	231	500	50	--------	--------	2,040	281
Trout:								
Fresh..........do....	27,822	1,377	1,500	120	--------	--------	29,322	1,497
Frozen..........do....	9,533	438	--------	--------	--------	--------	9,533	438
Dried..........do....	--------	--------	1,500	30	--------	--------	1,500	30
Sablefish:								
Fresh..........do....	8,990	271	--------	--------	--------	--------	8,990	271
Frozen..........do....	92,705	4,134	--------	--------	--------	--------	92,705	4,134
Pickled..........do....	1,400	100	--------	--------	--------	--------	1,400	100
Smelt: Fresh..........do....	--------	--------	500	50	--------	--------	500	50
Rockfishes:								
Fresh..........do....	428	10	--------	--------	--------	--------	428	10
Frozen..........do....	3,105	109	--------	--------	--------	--------	3,105	109
Flounders: Fresh..........do....	75,000	1,125	--------	--------	--------	--------	75,000	1,125
Total..........	--------	12,173,018	--------	8,816,022	--------	11,137,548	--------	[1] 32,126,588

[1] These figures represent the value of the manufactured product. It is estimated that the value of the catch, exclusive of whales, to the fishermen was approximately $9,089,000. The round weight of the salmon catch landed by the fishermen was approximately 467,349,000 pounds, and the corresponding figure for herring was about 140,580,000 pounds. The cod figures given above do not include the offshore catch from waters adjacent to Alaska, which amounted to 4,860,069 pounds of dry-salted cod and 30,400 pounds of tongues, having a total value of $166,601, landed at ports of the Pacific Coast States.

956 gill nets, or 44,410 fathoms, as compared with 1,499 gill nets, or 63,105 fathoms, in 1932; and 119 driven and 19 floating traps, as compared with 127 driven and 22 floating traps in 1932.

In western Alaska, 9 seines, or 1,540 fathoms of webbing, were used, an increase of 5 seines and 765 fathoms of webbing over the figures for 1932. There were 2,061 gill nets used, or an aggregate of 154,625 fathoms, an increase of 155 nets and 31,859 fathoms of webbing. One driven trap was operated, the same as in 1932.

Seines caught 21 percent of the salmon taken in 1933, gill nets 33 percent, and traps 45 percent, while lines and wheels took the remaining 1 percent.

Percentage of salmon caught in each Alaska district, by principal forms of apparatus

Apparatus	Southeast Alaska		Central Alaska		Western Alaska	
	1932	1933	1932	1933	1932	1933
Seines	20	31	15	28	5	1
Gill nets	2	2	10	8	90	97
Traps	74	65	75	64		
Lines	4	2				
Wheels					5	2

The total catch of salmon in 1933 was 81,876,420, an increase of 6,192,845, or 8 percent, over the number taken in 1932. The southeastern and western districts showed gains of 1,123,677 and 5,649,932, respectively, while there was a decrease of 580,764 in central Alaska. By species, the catch of pinks increased 3,536,780 and reds 4,737,752, while the catch of cohos decreased 125,362, chums 1,682,748, and kings 273,577.

Salmon taken in 1933, by apparatus and species, in each geographic section of Alaska

Apparatus and species	Southeast Alaska	Central Alaska	Western Alaska	Total
Seines:				
Coho, or silver	150, 347	38, 500		188, 847
Chum, or keta	2, 401, 739	733, 250	15, 337	3, 150, 326
Pink, or humpback	7, 410, 854	5, 021, 511		12, 432, 365
King, or spring	1, 026	929	1, 638	3, 593
Red, or sockeye	212, 352	771, 940	360, 878	1, 345, 170
Total	10, 176, 318	6, 566, 130	377, 853	17, 120, 301
Gill nets:				
Coho, or silver	144, 096	172, 467	16, 859	333, 422
Chum, or keta	54, 109	39, 074	634, 777	727, 960
Pink, or humpback	186, 323	193, 674	28	380, 025
King, or spring	20, 624	60, 145	66, 337	147, 106
Red, or sockeye	210, 685	1, 301, 672	23, 902, 978	25, 415, 335
Total	615, 837	1, 767, 032	24, 620, 979	27, 003, 848
Traps:				
Coho, or silver	571, 425	515, 251		1, 086, 676
Chum, or keta	2, 091, 554	1, 455, 080		3, 546, 634
Pink, or humpback	18, 186, 018	8, 774, 005		26, 960, 023
King, or spring	7, 655	34, 665		42, 320
Red, or sockeye	587, 423	4, 286, 614	2, 344	4, 876, 381
Total	21, 444, 075	15, 065, 615	2, 344	36, 512, 034

Salmon taken in 1933, by apparatus and species, in each geographic section of Alaska—Continued

Apparatus and species	Southeast Alaska	Central Alaska	Western Alaska	Total
Lines:				
Coho, or silver	357, 213			357, 213
King, or spring	397, 884			397, 884
Total	755, 097			755, 097
Wheels:				
Chum, or keta			467, 300	467, 300
King, or spring			17, 840	17, 840
Total			485, 140	485, 140
Total:				
Coho, or silver	1, 223, 081	726, 218	16, 859	1, 966, 158
Chum, or keta	4, 547, 402	2, 227, 404	1, 117, 414	7, 892, 220
Pink, or humpback	25, 783, 195	13, 989, 190	28	39, 772, 413
King, or spring	427, 189	95, 739	85, 815	608, 743
Red, or sockeye	1, 010, 460	6, 360, 226	24, 266, 200	31, 636, 886
Grand total	32, 991, 327	23, 398, 777	25, 486, 316	81, 876, 420

CANNING

CHANGES IN CANNERIES

The plant of the Alaska Pacific Salmon Corporation at Kake that had been leased to Libby, McNeill & Libby for the season of 1932 was operated this year by the former company, which also reopened its cannery at Rose Inlet. The 5-year lease on the Metlakatla cannery to the Annette Island Packing Co. having expired at the close of 1932, a new company, incorporated under the name of Annette Island Canning Co., obtained the lease and operated the plant in 1933.

Two plants at Ketchikan that had been closed in 1932, the Iwersen Packing Co. and the floating plant *Pioneer*, of the Stuart Corporation, were taken over and operated by new organizations, the Kelly Packing Co. and the Berg Packing Co., respectively. Other new organizations which were formed to take over canneries in southeast Alaska and operate them under lease during the season were as follows: The Ocean Packing Co., which operated the plant of the Bayview Packing Co. at Klawak; the Douglas Fisheries Co., which operated the plant on Douglas Island that had been leased to the Ellson Packing Co. in 1932; the Klawock Packing Co., which took over the Demmert Packing Co.'s cannery at Klawak; Hanseth Bros., who operated the Scow Bay cannery that had been leased to O. Nicholson in 1932; and the Deep Sea Salmon Co., which operated the Skowl Arm Packing Co.'s plant at Skowl Arm.

The New England Fish Co. reopened its plants at Ketchikan and Noyes Island; and the plants of the Peril Straits Packing Co. and Petersburg Packing Co. at Todd and Petersburg, respectively, were also reopened and operated. A new cannery building was erected by the Diamond K Packing Co. at Wrangell on the site formerly occupied by the Alaska Sanitary Packing Co.'s plant, which was destroyed by fire in 1924. The new plant, which was in operation this year, replaces the floating cannery that has been used by the company since 1927.

All properties of the Northwestern Fisheries Co. in Alaska were leased by the Pacific American Fisheries, with option to purchase. The latter utilized some of the gear during the season, but none of the canneries was operated.

Joint operating arrangements, without any change of business organization, were again carried on by a number of canning companies to reduce the cost of production. The Standard Packing Co., which had been formed for the joint operation of the Pioneer Sea Foods Co. and the Shepard Point Packing Co. in 1932, was discontinued, and the latter companies resumed separate operations.

The cannery of the Columbia River Packers Association at Chignik was operated under lease by the Alaska Packers Association, as it had been in 1932, the latter's own plant remaining idle during the season. A new organization, the Glacier Sea Foods Co., leased and operated the cannery of the Glacier Packing Co. at Cordova. The cannery of A. N. Nilsen at Portlock and the San Juan Fishing & Packing Co.'s plant at Uganik Bay, which were idle in the previous year, were reopened and operated in 1933.

The Kustatan Packing Co. at Kustatan, which had devoted its operations chiefly to the production of canned clams in 1932, again engaged primarily in the canning of salmon. The Pioneer Packing Co., now known as the Pioneer Canneries, Inc., terminated its lease on the Hemrich Packing Co.'s cannery at Kukak Bay, and the plant was closed.

As its new shore cannery at Sand Point was ready for operation this year, the Alaska Pacific Salmon Corporation did not lease the floating plant *International*, as in the two previous seasons, and the operation of the latter was carried on by the International Packing Co. Toward the close of 1933 the International Packing Co. acquired the plant at Uzinki formerly operated by the Katmai Packing Co., which has been idle since 1930.

The floating plant *Santa Flavia*, of the Associated Fishermen of Alaska, Inc., was leased to the Lowe Trading Co. and operated near the mouth of the Nushagak River. The Red Salmon Canning Co. reopened its plant on the Ugashik River, which had been closed since 1929. Operations of the Herendeen Bay Consolidated Canneries were carried on aboard the floating cannery *Mazama*, of the Everett Packing Co., which had not been used as a cannery since 1930.

NEW CANNERIES

Three new canneries, in the central district, are included in the list of canneries operated in Alaska in 1933. These are the plants of A. S. Day at Fort Liscum, the Enterprise Seafood Co. at Ninilchik, and the new shore cannery of the Alaska Pacific Salmon Corporation at Sand Point.

CANNERIES NOT OPERATED

Eleven canneries that were operated in the previous year were closed during the 1933 season, 1 of which was in southeastern, 9 in central, and 1 in western Alaska. The plant of the Kenai River Packing Co., at Kenai, and the plant formerly belonging to the Hetta Packing Co., at Coppermount, which has been acquired by the Nakat Packing Corporation, have been dropped from the list of idle plants, as there is little likelihood of their being operated again.

The following canneries were closed during the year but may be reopened:

Southeast Alaska:	
Alaska Pacific Fisheries	Burnett Inlet.
Alaska Pacific Salmon Corporation	Boca de Quadra. Chomly. Funter Bay. Pybus Bay. Tenakee.
Alaska Packers Association	Loring. Wrangell.
Alaska Sanitary Packing Co	Cape Fanshaw.
Columbia River Packers Association	Lake Bay.
Hoonah Packing Co	Hoonah. Gambier Bay.
Icy Straits Fisheries, Inc. (floating plant)	Idaho Inlet.
Libby, McNeill & Libby	Klawak.
The Nakat Packing Corporation	Ketchikan.
New England Fish Co	Chatham. Yakutat.
Pacific American Fisheries	Boca de Quadra. Dundas Bay. Excursion Inlet. Hunter Bay. Kasaan. Ketchikan. Port Walter. Santa Ana. Shakan.
Central Alaska:	
Alaska Pacific Salmon Corporation	Drier Bay.
Alaska Packers Association	Alitak. Chignik. Kasilof.
Alitak Fish Co	Zachar Bay.
Anderson Mercantile Co., Inc	Deep Creek.
Blue Island Packing Co	Blue Fox Bay.
W. G. Culver	Point McManus.
Farwest Fisheries, Inc	Anchorage.
Fidalgo Island Packing Co	Port Graham.
Gustan & Vogel	Point Possession.
Hemrich Packing Co	Kukak Bay.
International Packing Co	Uzinki.
Kadiak Fisheries Co	Shearwater Bay.
New England Fish Co	Cordova.
North Coast Packing Co	Ninilchik.
Northern Light Packing Co	Mountain Slough.
Pacific American Fisheries	Bering River. Chignik. Kenai. King Cove. Orca. Unakwik Inlet. Uyak. Valdez.
Charles W. Pajoman	Iron Creek.
Point Possession Fish Co	Point Possession.
Port Williams Packing Corporation	Port Williams.
Prince Packing Co	Drier Bay.
Redoubt Bay Packing Co	Redoubt Bay.
San Juan Fishing & Packing Co	Tutka Bay.
E. Sandvik	Swansons Creek.
Shelikof Packing Co	Zachar Bay.

Central Alaska—Continued.

Shepard Point Packing Co	Port Ashton.
Harvey J. Smith	West Foreland.
Spur Fish Corporation	Nikishka Bay.
Strand-Jensen Fisheries Co	Cordova.
Sunset Packing Co	Otter Creek.
Toman Packing Co	Anchorage.
Trinity Packing Co	Three Saints Bay.
John Wik	Kenai.
Jake Young	Port Chatham.

Western Alaska:

Alaska Packers Association	Naknek River. Nushagak Bay.
Columbia River Packers Association	Nushagak Bay only.
Herendeen Bay Consolidated Canneries	Herendeen Bay.
Pacific American Fisheries	Naknek River. Nushagak. Port Moller.
Red Salmon Canning Co	Naknek River.

TOTAL CANNERIES OPERATED

There were 91 canneries operated in Alaska in 1933—37 in southeast, 32 in central, and 22 in western Alaska—which is 6 more in the southeast and 2 less in the central district than in 1932, a net gain of 4 plants. The International Packing Co. operated the floating cannery *International* in both the central and western districts, and the Herendeen Bay Consolidated Canneries prepared a small pack aboard the *Mazama* in southeast Alaska on its return from operations in Herendeen Bay, but each is included but once in the total, the former being credited to central and the latter to western Alaska.

Companies that canned salmon in Alaska, number and location of canneries operated, and number of traps owned by each, 1933

[New canneries indicated by (*)]

Company	Canneries		Traps		
	Number	Location	Driven	Floating	Total
Southeast Alaska:					
Alaska Pacific Salmon Corporation	4	Kake		9	9
		Ketchikan	4	2	6
		Port Althorp		12	12
		Rose Inlet		6	6
Annette Island Canning Co	1	Metlakatla		6	6
Astoria & Puget Sound Canning Co	1	Excursion Inlet		9	9
Beegle Packing Co	1	Ketchikan	1	3	4
Berg Packing Co	1	Tongass Narrows (floating).			
Columbia River Packers Association		Lake Bay [1]		2	2
Deep Sea Salmon Co	1	Skowl Arm		8	8
Diamond K Packing Co	1	Wrangell		5	5
Douglas Fisheries Co	1	Douglas			
Fidalgo Island Packing Co	2	Bay of Pillars	5		5
		Ketchikan	2	5	7
Haines Packing Co	1	Letnikof Cove			
Hanseth Bros	1	Scow Bay		1	1
P. E. Harris & Co	1	Hawk Inlet		7	7
Herendeen Bay Consolidated Canneries	1	Tebenkof Bay (floating).			
Hood Bay Canning Co	1	Hood Bay		4	4
Independent Salmon Canneries (Inc.)	1	Ketchikan		1	1
Kelly Packing Co	1	do			
Ketchikan Packing Co	1	do		2	2
Klawock Packing Co	1	Klawak			
Libby, McNeill & Libby	3	Craig	2	15	17
		George Inlet		7	7
		Yakutat			
Nakat Packing Corporation, The	3	Hidden Inlet		7	7
		Union Bay		6	6
		Waterfall		11	11

[1] Traps only were operated, the fish being packed at other canneries.

Companies that canned salmon in Alaska, number and location of canneries operated, and number of traps owned by each, 1933—Continued

Company	Canneries		Traps		
	Number	Location	Driven	Floating	Total
Southeast Alaska:					
New England Fish Co.	2	Ketchikan		6	6
		Noyes Island		6	6
Ocean Packing Co.	1	Klawak			
Pacific American Fisheries		Excursion Inlet [1]	1	5	6
Peril Straits Packing Co.	1	Todd		5	5
Petersburg Packing Co.	1	Petersburg	2	7	9
Pyramid Packing Co., Inc.	1	Sitka		4	4
Sebastian Stuart Fish Co.	1	Tyee		7	7
Superior Packing Co.	1	Tenakee		5	5
Ward's Cove Packing Co.	1	Ward Cove		5	5
Wrangell Packing Co.	1	Wrangell		1	1
Central Alaska:					
Alaska Pacific Salmon Corporation	1	Sand Point •	2		2
Alaska Packers Association	2	Chignik	2		2
		Karluk	4		4
Alaska Year-Round Canneries Co.	1	Seldovia	3		3
Alitak Fish Co.	1	Alitak	8		8
Columbia River Packers Association		Chignik [1]	4		4
Cook Inlet Packing Co.	1	Seldovia	6		6
Copper River Packing Co.	1	McClure Bay		5	5
Harry W. Crosby	1	Chignik			
A. S. Day	1	Fort Liscum •			
H. J. Emard	1	Anchorage	4		4
Enterprise Seafood Co.	1	Ninilchik •			
Farwest Fisheries, Inc.		Anchorage [1]	2		2
Glacier Sea Foods Co.	1	Cordova (floating)			
Grimes Packing Co.	1	Uzinki			
P. E. Harris & Co.	1	False Pass	8		8
International Packing Co.	1	Kupreanof Harbor and Uyak Bay (floating)			
Kadiak Fisheries Co.	1	Kodiak	5		5
Kustatan Packing Co.	1	Kustatan			
Libby, McNeill & Libby	1	Kenai	10		10
A. N. Nilson	1	Portlock			
Ninilchik Packing Co.	1	Ninilchik	1		1
North Coast Packing Co.		do [1]	2		2
Pacific American Fisheries	1	Chignik [1]	2		2
		Ikatan	15		15
Pioneer Canneries, Inc.	1	Cordova			
Pioneer Sea Foods Co.	1	Eyak River	1	3	4
Premier Salmon Co.	1	Stevens Creek	3	1	4
Sandvik & Sandvik	1	Uganik Village			
San Juan Fishing & Packing Co.	2	Port San Juan	2	3	5
		Uganik Bay	5		5
Seward Fisheries, Inc.	1	Seward			
Shepard Point Packing Co.	1	Shepard Point		7	7
Shumagin Packing Co.	1	Squaw Harbor	3		3
Snug Harbor Packing Co.	1	Snug Harbor	6		6
Uganik Fisheries, Inc.	1	Uganik	3		3
Western Alaska:					
Alaska Packers Association	7	Egegik River			
		Kvichak Bay (2)			
		Naknek River (2)			
		Nushagak Bay			
		Ugashik River			
Alaska-Portland Packers Association	2	Naknek River			
		Nushagak Bay			
Alaska Salmon Co.	1	Wood River			
Bristol Bay Packing Co.	1	Kvichak Bay			
Herendeen Bay Consolidated Canneries	1	Herendeen Bay (floating)	1		1
International Packing Co.	1	Port Moller (floating)			
Libby, McNeill & Libby	6	Egegik River			
		Ekuk			
		Koggiung			
		Libbyville			
		Lockanok			
		Nushagak			
Lowe Trading Co.	1	Nushagak River (floating)			
Nakat Packing Corporation, The	1	Naknek			
Red Salmon Canning Co.	2	Naknek River			
		Ugashik River			

[1] Traps only were operated, the fish being packed at other canneries.

LOSSES AND DISASTERS

In southeastern Alaska the plant of Libby, McNeill & Libby at Karheen, which had not been operated since 1930, was destroyed by fire on August 18. Other property losses in that district included motor boats, miscellaneous fishing gear, and equipment, valued at $28,805.

Reported losses in central Alaska were a pile driver, small boats, and fishing gear valued at $16,827; and in the western district, small boats, fish nets, and damage to buildings, amounting to $25,068.

Twenty-two lives were lost—9 in southeast Alaska, 7 in central, and 6 in western Alaska. In the southeastern district 5 fishermen were drowned, and 2 fishermen and 2 shoresmen were killed in accidents. One fisherman and 1 transporter in central Alaska were drowned, 1 fisherman and 3 shoresmen died of disease, and 1 transporter met death by accident. In western Alaska 2 fishermen and 2 shoresmen were drowned, and 2 fishermen died of disease.

STATISTICS

There were 91 canneries operated in Alaska in 1933, or 4 more than in the previous year. Employment was given to 17,130 persons, as compared with 15,738 in 1932, an increase of 1,392. White employees increased 408; natives, 648; Japanese, 165; Filipinos, 230; Mexicans, 12; Negroes, 5; and miscellaneous (Kanakas, Koreans, and Puerto Ricans), 11; while Chinese decreased 87.

The total pack of canned salmon was 5,225,604 cases, valued at $28,376,014. This was a decrease of 28,879 cases, or about one-half of 1 percent, from the pack of 1932, but an increase in value of $6,660,213, or about 31 percent. The output in southeast Alaska decreased from 2,208,053 to 2,087,951 cases, or 5 percent; and in central Alaska from 1,624,598 cases to 1,485,994 cases, or about 9 percent; while in western Alaska there was an increase from 1,421,832 cases to 1,651,659 cases, or 16 percent. In Alaska as a whole the pack of reds increased from 2,103,081 cases to 2,180,283 cases, or 4 percent; pinks increased from 2,113,145 to 2,182,551 cases, or 3 percent; and cohos from 148,175 to 162,568 cases, or 10 percent; while chums decreased from 820,556 to 658,789 cases, or 20 percent; and kings from 69,526 to 41,413 cases, or 40 percent.

Data are included in the following tables to show comparison of the 1933 pack with the average for the 5 preceding years, 1928 to 1932, by cases of each species and by districts. Only one species—red salmon—shows a gain over the 5-year average, and this gain is entirely offset by the declines in the other species. By districts, the pack in western Alaska increased 44 percent, while in southeast and central Alaska the pack decreased 18 and 14 percent, respectively, making a net decrease of 4 percent from the 5-year average.

Persons engaged, wages paid, and operating units of Alaska salmon canning industry, 1933

Items	Southeast Alaska	Central Alaska	Western Alaska	Total
PERSONS ENGAGED				
Fishermen:				
Whites	795	717	1,769	3,281
Natives	1,281	428	399	2,108
Filipinos	3		3	6
Mexican	1			1
Miscellaneous [1]		2		2
Total	2,080	1,147	2,171	5,398
Shoresmen:				
Whites	1,340	920	1,452	3,712
Natives	1,363	598	128	2,089
Chinese	90	156	349	595
Japanese	419	222	302	943
Filipinos	950	655	587	2,192
Mexicans	4	4	893	901
Negroes	2		55	57
Miscellaneous [1]	16		13	29
Total	4,184	2,555	3,779	10,518
Transporters:				
Whites	502	334	337	1,173
Natives	3	33		36
Japanese	1			1
Filipinos	3			3
Miscellaneous [1]		1		1
Total	509	368	337	1,214
Total:				
Whites	2,637	1,971	3,558	8,166
Natives	2,647	1,059	527	4,233
Chinese	90	156	349	595
Japanese	420	222	302	944
Filipinos	956	655	590	2,201
Mexicans	5	4	893	902
Negroes	2		55	57
Miscellaneous [1]	16	3	13	32
Grand total	6,773	4,070	6,287	17,130
Wages paid shoresmen	$999,146	$760,444	$1,145,329	$2,904,919
Wages paid transporters	191,387	130,445	114,352	436,184
OPERATING UNITS				
Plants:				
Shore canneries	36	30	20	86
Floating canneries:				
Power vessels		1	2	3
Net tonnage		1,760	3,024	4,784
Barges	1	1		2
Net tonnage	1,092	389		1,481
Total plants operated	37	32	22	91
Vessels:				
Power, over 5 tons	293	101	80	474
Net tonnage	5,752	4,718	21,191	31,661
Launches	76	122	28	226
Power dories	31	64		95
Gill-net boats	140	96	1,027	1,263
Seine skiffs	118	114		232
Other rowboats and skiffs	605	460	150	1,215
Lighters and scows	102	162	138	402
Houseboats	12	2	32	46
Pile drivers	19	19	16	54
Pile pullers	3	4		7
Rigging scows	30	5		35
Apparatus:				
Purse seines	321	61	6	338
Fathoms	51,975	5,845	1,426	59,246
Beach seines	3	81		84
Fathoms	300	8,807		9,107
Gill nets	258	932	1,382	2,572
Fathoms	24,375	43,535	142,967	210,877
Traps, driven	19	119	1	139
Traps, floating	242	19		261

[1] Kanakas, Koreans, and Puerto Ricans.

Output and value of canned salmon in Alaska in 1933 [1]

Product	Southeast Alaska		Central Alaska		Western Alaska		Total	
	Cases	Value	Cases	Value	Cases	Value	Cases	Value
Coho, or silver:								
½-pound flat	2,972	$22,335	395	$2,368			3,367	$24,703
1-pound flat	2,096	12,576	2,561	14,133			4,657	26,709
1-pound tall	90,737	472,569	62,351	313,521	1,456	$7,517	154,544	793,607
Total	95,805	507,480	65,307	330,022	1,456	7,517	162,568	845,019
Chum, or keta:								
½-pound flat	250	1,365	408	2,287			658	3,652
1-pound tall	424,611	1,728,120	207,471	865,780	26,049	115,254	658,131	2,709,154
Total	424,861	1,729,485	207,879	868,067	26,049	115,254	658,789	2,712,806
Pink, or humpback:								
½-pound flat	10,540	64,660	4,317	27,629			14,857	92,289
1-pound tall	1,467,473	6,664,922	700,221	3,116,508			2,167,694	9,781,430
Total	1,478,013	6,729,582	704,538	3,144,137			2,182,551	9,873,719
King, or spring:								
½-pound flat	1,084	9,676	7,397	79,637	1,474	14,745	9,955	104,058
1-pound flat	3,189	27,608	3,811	31,032	3,021	28,480	10,021	87,120
1-pound tall	3,873	21,111	12,578	69,964	4,986	28,929	21,437	120,004
Total	8,146	58,395	23,786	180,633	9,481	72,154	41,413	311,182
Red, or sockeye:								
½-pound flat	12,827	121,842	40,664	392,209	147	1,073	53,638	515,124
1-pound flat	3,832	30,656	54,651	411,717	1,569	10,277	60,052	452,650
1-pound tall	64,467	421,349	389,169	2,532,373	1,612,957	10,711,792	2,066,593	13,065,514
Total	81,126	573,847	484,484	3,336,299	1,614,673	10,723,142	2,180,283	14,633,288
Grand total	2,087,951	9,598,789	1,485,994	7,859,158	1,651,659	10,918,067	5,225,604	28,376,014

[1] Cases containing ½-pound cans have been reduced one-half in number, and thus, for the purpose of affording fair comparison, all are put upon the basis of forty-eight 1-pound cans to the case.

Output of canned salmon in Alaska, in cases, 1928 to 1933 [1]

BY SPECIES

Product	1928	1929	1930	1931	1932	Average for 5-year period, 1928–32	1933	Percentage increase or decrease in 1933, as compared with 5-year average
Coho, or silver:								
¼-pound flat			371			74		−100.00
½-pound flat	13,498	7,880	18,808	9,962	3,442	10,718	3,367	−68.59
1-pound flat	5,840	6,730	5,926	2,902	1,763	4,632	4,657	+0.54
1-pound tall	279,285	157,346	307,317	157,014	142,970	208,787	154,544	−25.98
Total	298,623	171,956	332,422	169,878	148,175	224,211	162,568	−27.49
Chum, or keta:								
½-pound flat	5,057	4,961	8,384	4,242	624	4,654	658	−85.86
1-pound flat	4			35		8		−100.00
1-pound tall	990,724	859,551	591,550	529,579	819,932	758,267	658,131	−13.21
Total	995,785	864,512	599,934	533,856	820,556	762,929	658,789	−13.65

[1] The number of cases shown has been put upon the common basis of forty-eight 1-pound cans per case.

Output of canned salmon in Alaska, in cases, 1928 to 1933—Continued

BY SPECIES—Continued

Product	1928	1929	1930	1931	1932	Average for 5-year period, 1928–32	1933	Percentage increase or decrease in 1933, as compared with 5-year average
Pink, or humpback:								
¼-pound flat			1, 113			222		−100. 00
½-pound flat	40, 473	44, 762	81, 064	46, 524	7, 166	43, 998	14, 857	−66. 23
1-pound flat	6, 189	3, 910	4, 867	4, 410		3, 875		−100. 00
1-pound tall	2, 740, 580	2, 522, 985	3, 101, 490	2, 902, 926	2, 105, 979	2, 674, 792	2, 167, 694	−18. 96
Total	2, 787, 242	2, 571, 657	3, 188, 534	2, 953, 860	2, 113, 145	2, 722, 887	2, 182, 551	−19. 84
King, or spring:								
½-pound flat	11, 782	16, 320	17, 840	13, 208	11, 713	14, 172	9, 955	−29. 76
1-pound flat	14, 854	26, 808	23, 686	16, 721	14, 800	19, 374	10, 021	−48. 28
1-pound tall	27, 523	28, 979	18, 396	21, 938	43, 013	27, 970	21, 437	−23. 36
Total	54, 159	72, 107	59, 922	51, 867	69, 526	61, 516	41, 413	−32. 68
Red, or sockeye:								
¼-pound flat			370			74		−100. 00
½-pound flat	89, 063	100, 136	110, 605	58, 178	47, 707	81, 138	53, 638	−33. 89
1-pound flat	87, 100	75, 326	62, 972	41, 002	75, 524	68, 385	60, 052	−12. 19
1-pound tall	1, 771, 931	1, 514, 465	677, 567	1, 595, 098	1, 979, 850	1, 507, 782	2, 066, 593	+37. 06
Total	1, 948, 094	1, 689, 927	851, 514	1, 694, 278	2, 103, 081	1, 657, 379	2, 180, 283	+31. 55
Grand total	6, 083, 903	5, 370, 159	5, 032, 326	5, 403, 739	5, 254, 483	5, 428, 922	5, 225, 604	−3. 75

BY DISTRICTS AND SPECIES

Southeast Alaska:								
Coho, or silver	145, 770	97, 847	155, 652	88, 455	87, 038	114, 952	95, 805	−16. 66
Chum, or keta	570, 219	290, 797	283, 478	274, 248	579, 443	399, 637	424, 861	+6. 31
Pink, or humpback	2, 142, 838	1, 542, 615	2, 309, 976	2, 013, 442	1, 379, 006	1, 877, 576	1, 478, 013	−21. 28
King, or spring	5, 522	7, 000	6, 939	14, 896	23, 624	11, 596	8, 146	−29. 75
Red, or sockeye	106, 798	162, 952	221, 241	147, 895	138, 942	155, 566	81, 126	−47. 85
Total	2, 971, 147	2, 101, 211	2, 977, 286	2, 538, 936	2, 208, 053	2, 559, 327	2, 087, 951	−18. 42
Central Alaska:								
Coho, or silver	152, 360	71, 330	173, 352	81, 331	60, 674	107, 809	65, 307	−39. 42
Chum, or keta	377, 857	497, 774	284, 751	193, 053	147, 410	300, 169	207, 879	−30. 75
Pink, or humpback	643, 330	1, 025, 652	859, 761	940, 418	724, 051	838, 642	704, 538	−15. 99
King, or spring	35, 036	35, 661	32, 060	27, 599	32, 302	32, 532	23, 786	−26. 88
Red, or sockeye	430, 572	454, 086	268, 621	439, 153	660, 161	450, 519	484, 484	+7. 54
Total	1, 639, 155	2, 084, 503	1, 618, 545	1, 681, 554	1, 624, 598	1, 729, 671	1, 485, 994	−14. 09
Western Alaska:								
Coho, or silver	493	2, 779	3, 418	92	463	1, 449	1, 456	+. 48
Chum, or keta	47, 709	75, 941	31, 705	66, 555	93, 703	63, 123	26, 049	−58. 73
Pink, or humpback	1, 074	3, 390	18, 797		10, 088	6, 070		−100. 00
King, or spring	13, 601	29, 446	20, 923	9, 372	13, 600	17, 388	9, 481	−45. 47
Red, or sockeye	1, 410, 724	1, 072, 880	361, 652	1, 107, 230	1, 303, 978	1, 051, 294	1, 614, 673	+53. 59
Total	1, 473, 601	1, 184, 445	436, 495	1, 183, 249	1, 421, 832	1, 139, 924	1, 651, 659	+44. 89
Grand total	6, 083, 903	5, 370, 159	5, 032, 326	5, 403, 739	5, 254, 483	5, 428, 922	5, 225, 604	−3. 75

Relative importance of each species of canned salmon within each district in 1933

District	Coho	Chum	Pink	King	Red	Total, all species
	Percent	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Southeast Alaska	4.6	20.3	70.8	0.4	3.9	100.0
Central Alaska	4.4	14.0	47.4	1.6	32.6	100.0
Western Alaska	.1	1.6	.0	.6	97.7	100.0
All Alaska	3.1	12.6	41.8	.8	41.7	100.0

Relative importance of each district in the production of each species of salmon canned in 1933

District	Coho	Chum	Pink	King	Red	Total, all species
	Percent	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Southeast Alaska	59.0	64.5	67.7	19.7	3.7	40.0
Central Alaska	40.1	31.6	32.3	57.4	22.2	28.4
Western Alaska	.9	3.9	.0	22.9	74.1	31.6
Total	100.0	100.0	100.0	100.0	100.0	100.0

Average annual price per case of forty-eight 1-pound cans of salmon, 1923–33

Product	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933
Coho, or silver	$5.74	$6.83	$9.72	$8.40	$8.51	$7.12	$7.59	$8.26	$6.51	$4.12	$5.20
Chum, or keta	4.65	4.68	4.44	5.01	5.47	6.06	5.35	3.60	3.19	2.79	4.12
Pink, or humpback	4.86	4.93	5.28	5.39	5.87	6.56	6.06	4.17	3.46	3.14	4.52
King, or spring	8.56	8.89	11.91	10.37	11.25	11.13	11.92	13.32	9.40	5.46	7.51
Red, or sockeye	9.27	9.53	13.12	9.89	12.08	9.41	10.71	12.57	9.20	5.61	6.71

PACK IN CERTAIN DISTRICTS

Statistics of the salmon pack are again presented for subdivisions of the three main districts of Alaska, and comparison is made with similar statistics for 1932. Where the pack at a given cannery is made up of fish from more than one district, as in the case of that at certain Cordova canneries which pack fish caught both in Prince William Sound and in the Copper River area or at various plants in southeastern Alaska which draw for their supply on the catch of more than one district, due segregation has been made in order to credit each district with the pack from salmon caught therein. These districts are described as follows:

WESTERN ALASKA

Bristol Bay.—The Bering Sea shore, east and north of the Ugashik River.

Port Moller and Herendeen Bay.—Port Moller, Herendeen Bay, and Nelson Lagoon.

CENTRAL ALASKA

Ikatan-Shumagin Islands.—False Pass, Ikatan Bay, King Cove, and the Shumagin Islands.

Chignik.—Canneries located at Chignik.

Kodiak-Afognak Islands.—Kodiak, Spruce, and Raspberry Islands.

Cook Inlet.—The shores of Cook Inlet.

Prince William Sound.—Resurrection Bay to Point Whitshed.

Copper and Bering Rivers.—Point Whitshed to Bering River.

SOUTHEASTERN ALASKA

Yakutat and Dry Bay.—Yakutat Bay to and including Dry Bay.

Icy Strait-Lynn Canal.—West coast of Baranof and Chichagoof Islands, the shores of Cross Sound, Icy Strait, Lynn Canal, and Stephens Passage, south to Taku Harbor.

Chatham Strait-Frederick Sound.—Both shores of Chatham Strait and its bays from Point Augusta to Cape Ommaney, and through Frederick Sound and its bays northward to Taku Harbor, including Kake.

Sumner Strait-Dixon Entrance.—Southward from Petersburg and eastward from Port Beauclerc to Cape Chacon and Dixon Entrance, and including all canneries on the mainland and intervening islands from the Stikine River to Portland Canal.

West coast, Prince of Wales Island.—Territory west and south of a line from Cape Chacon to Point Baker and Cape Ommaney.

Pack of canned salmon in Alaska in 1933, by districts [1]

District	Coho	Chum	Pink	King	Red	Total	Percentage increase or decrease from 1932
	Cases	*Cases*	*Cases*	*Cases*	*Cases*	*Cases*	
Bristol Bay	1,456	24,559		9,197	1,588,008	1,623,220	+21.39
Port Moller and Herendeen Bay		1,490		284	26,665	28,439	−66.42
Ikatan-Shumagin Islands	17,082	109,608	156,556	3,130	152,073	438,449	−16.83
Chignik	4,051	11,188	16,369	249	55,541	87,398	−57.35
Kodiak-Afognak Islands	8,222	50,134	331,000	283	108,787	498,426	+35.51
Cook Inlet	16,419	5,277	5,951	14,710	98,510	140,867	−16.45
Prince William Sound	8,317	31,072	194,646	723	12,786	248,144	−11.15
Copper and Bering Rivers	11,216		16	4,691	56,787	72,710	−5.33
Yakutat and Dry Bay	15,331	275	5,774	3,216	11,686	36,282	−30.27
Icy Strait-Lynn Canal	14,480	97,556	290,238	47	29,480	431,801	−14.24
Chatham Strait-Frederick Sound	14,929	172,812	308,211	820	6,445	503,217	+34.59
Sumner Strait-Dixon Entrance	33,845	87,999	638,731	493	25,502	786,570	−16.12
West coast, Prince of Wales Island	17,220	66,219	235,059	3,570	8,013	330,081	−3.18
Total	162,568	658,789	2,182,551	41,413	2,180,283	5,225,604	−0.55

[1] Pack reduced to the basis of forty-eight 1-pound cans per case.

MILD CURING

The quantity of mild-cured salmon produced in Alaska in 1933 was somewhat less than in the previous year, but prices were decidedly better, and the total value of the product showed a marked increase. An important influence in the price situation was the widespread trollers' strike along the Pacific coast, which continued through May and June.

Only a partial enumeration of the trolling boats in southeastern Alaska was made by the Bureau, as the patrol force that carries on this work in connection with other duties was greatly curtailed by lack of funds. Therefore the more complete figures for 1932 have been used, as reports indicate that there were as many trollers engaged in 1933 as in the previous year. Sixteen plants were engaged in the industry, and the number of persons employed was 1,175.

The total output of mild-cured salmon was 3,923,200 pounds, valued at $622,828, a decrease of 511,200 pounds in quantity but an increase of $161,324 in value, as compared with the production for 1932.

Persons engaged, wages paid, and operating units, Alaska salmon mild-curing industry, 1933

Item	Southeast Alaska	Western Alaska	Total
PERSONS ENGAGED			
Fishermen:			
Whites	664	1	665
Natives	360	11	371
Total	1,024	12	1,036
Shoresmen:			
Whites	80	1	81
Natives	12	19	31
Total	92	20	112
Transporters:			
Whites	23		23
Natives	2	2	4
Total	25	2	27
Grand total	1,141	34	1,175
Wages paid shoresmen	$57,487	$2,200	$59,687
Wages paid transporters	12,446	270	12,716

Item	Southeast Alaska	Western Alaska	Total
OPERATING UNITS			
Plants:			
Shore	11	2	13
Floating:			
Barges	3		3
Net tonnage	720		720
Total plants operated	14	2	16
Vessels:			
Power, over 5 tons	152	1	153
Net tonnage	1,218	50	1,268
Launches	589	3	592
Gill-net boat		1	1
Rowboats and skiffs	158	5	163
Lighters and scows	3	1	4
Houseboats	2		2
Apparatus:			
Gill nets	3	17	20
Fathoms	150	570	720
Lines	3,047		3,047
Wheels		2	2

Products of Alaska salmon mild-curing industry in 1933

Products	Southeast Alaska		Western Alaska		Total	
	Pounds	Value	Pounds	Value	Pounds	Value
Coho, or silver	252,800	$26,310			[1] 252,800	$26,310
Chum, or keta	9,600	1,200			[2] 9,600	1,200
King, or spring	[3] 3,555,200	584,883	[4] 105,600	$10,435	[5] 3,660,800	595,318
Total	3,817,600	612,393	105,600	10,435	3,923,200	622,828

[1] 316 tierces.
[2] 12 tierces.
[3] 4,444 tierces.
[4] 132 tierces.
[5] 4,576 tierces.

PICKLING

The excellent runs of red salmon in the Bristol Bay region, which enabled the packers to fill all their cans before the end of the fishing season, was undoubtedly the chief factor in accounting for the increased output of pickled salmon in Alaska in 1933. The total production was more than three times that of the preceding year and, with the exception of that for 1931, was the largest for any year since 1926.

One hundred and six persons were engaged in the industry—an increase of 17 over the number employed in 1932. The total output was 1,034,950 pounds, valued at $73,920, as compared with 305,410 pounds, valued at $20,629 in 1932—an increase of about 239 percent in quantity and 258 percent in value.

Persons engaged, wages paid, and operating units, Alaska salmon-pickling industry, 1933

Item	Southeast Alaska	Central Alaska	Western Alaska	Total
PERSONS ENGAGED				
Fishermen:				
Whites	2	24	26	52
Natives		10	19	29
Total	2	34	45	81
Shoresmen:				
Whites			10	10
Natives		5	10	15
Total		5	20	25
Grand total	2	39	65	106
Wages paid shoresmen		$460	$4,070	$4,530
OPERATING UNITS				
Plants, shore	1	21	8	30
Vessels:				
Power, over 5 tons		1		1
Net tonnage		11		11
Launches	1	5	1	7
Power dories		9	2	11
Gill-net boats	2	2	4	8
Rowboats and skiffs		16	7	23
Scow		1		1
Apparatus:				
Purse seine		1		1
Fathoms		100		100
Beach seines		13	3	16
Fathoms		750	115	865
Gill nets	4	22	40	66
Fathoms	100	825	2,325	3,250

Products of Alaska salmon-pickling industry in 1933

Species	Southeast Alaska		Central Alaska		Western Alaska		Total	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Coho, or silver	5,200	$260	34,700	$2,088	800	$50	40,700	$2,398
Chum, or keta			200	11	4,800	348	5,000	359
Pink, or humpback			600	45	300	12	900	57
King, or spring			15,800	1,697	28,300	2,605	44,100	4,302
Red, or sockeye	8,800	666	291,150	23,267	644,300	42,871	944,250	66,804
Total	14,000	926	342,450	27,108	678,500	45,886	1,034,950	73,920

FRESH SALMON

Of the 12 operators in southeast Alaska who reported the production of fresh salmon, 2 were engaged primarily in that business and gave employment to 4 white shoresmen. The operations of the others were mainly incidental to the mild curing of salmon and to the halibut fishery. The output consisted of 526,153 pounds of kings valued at $29,722 and 33,134 pounds of cohos valued at $879, a total of 559,287 pounds valued at $30,601, against 1,095,913 pounds valued at $70,574 in 1932—a decrease of approximately 49 percent in quantity and 57 percent in value.

The foregoing figures are exclusive of the fresh salmon sold to halibut boats for bait, which is shown under miscellaneous salmon products.

FREEZING

Operations in the salmon freezing business in 1933 were carried on only in southeastern Alaska and were largely incidental to other lines of the fishery industry. One cold-storage plant whose chief output was frozen salmon gave employment to 20 white shoresmen. The total output of frozen salmon was 4,236,252 pounds, valued at $221,382, a decrease of 31 percent in quantity and 2 percent in value from the previous year, when 6,116,921 pounds valued at $226,204 were prepared.

Products of the frozen-salmon industry in 1933

Species	Pounds	Value	Species	Pounds	Value
Coho, or silver	2,749,987	$127,782	Red, or sockeye	1,300	$124
Chum, or keta	179,373	2,735	Total	4,236,252	221,382
Pink, or humpback	2,574	133			
King, or spring	1,303,018	90,608			

DRY-SALTED, DRIED, AND OTHER MISCELLANEOUS SALMON PRODUCTS

A small quantity of canned smoked salmon was again prepared in southeast and central Alaska, and some dried salmon also was produced in the latter district, where employment was given to five white fishermen. Operators in these districts reported the sale of a limited number of salmon to halibut boats for bait. A small output of dry-salted salmon and dried salmon was produced in the Bristol Bay area in connection with salmon-pickling operations.

In the fishery of the Yukon, Tanana, and Kuskokwim Rivers, which is carried on chiefly by natives, 1,348,000 pounds of chum salmon were dried, valued at $53,840, and 528 pounds of kings were smoked and canned, valued at $75. In this region 12 whites and 600 natives engaged in the fishery, and the apparatus used consisted of 278 wheels, 622 gill nets of 8,763 fathoms, and 50 rowboats and skiffs.

BYPRODUCTS

Salmon byproducts were prepared by one plant in southeast Alaska, which employed 15 white shoresmen, and by 1 salmon cannery in the central district in connection with its canning operations. The total production was 913,358 pounds of fertilizer, valued at $14,679, and 35,700 gallons of oil, valued at $5,748, as compared with 847,285 pounds of fertilizer, valued at $11,060, and 39,821 gallons of oil, valued at $5,770, in 1932—an increase of about 8 percent in the amount of fertilizer and a decrease of 10 percent in the output of oil.

Production of dry-salted, dried, and other miscellaneous salmon products in Alaska in 1933

Species	Southeast Alaska		Central Alaska		Western Alaska		Total	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Dry-salted: Red, or sockeye					15,107	$300	15,107	$300
Dried:								
Coho, or silver			1,800	$36			1,800	36
Chum, or keta			4,425	101	1,348,000	53,840	1,352,425	53,941
Pink, or humpback			25,200	504			25,200	504
Red, or sockeye					5,000	500	5,000	500
Total			31,425	641	1,353,000	54,340	1,384,425	54,981
Smoked and canned:								
King, or spring	3,360	$520	7,032	2,278	528	75	10,920	2,873
Red, or sockeye			1,968	369			1,968	369
Total	3,360	520	9,000	2,647	528	75	12,888	3,242
Fresh, for bait:								
Coho, or silver	200	2					200	2
Chum, or keta	23,100	100					23,100	100
Pink, or humpback	25,400	175	15,300	100			40,700	275
Total	48,700	277	15,300	100			64,000	377
Grand total	52,060	797	55,725	3,388	1,368,635	54,715	1,476,420	58,900

HERRING

Notwithstanding the continued low prices that prevailed throughout the season, particularly on Scotch-cured herring, the total yield of herring products showed a substantial gain over that of the previous year, due primarily to the increased production of herring meal and oil. The Scotch-cured product was slightly less than in 1932, but there was a fair output of Norwegian-cured herring, which more than made up the difference. A sharp decline occurred in the amount of herring sold to halibut boats for bait, and the shortage in this commodity strengthened the price to a considerable extent.

Although the output of Scotch-cured herring in the Kodiak area dropped from 5,411,400 pounds in 1932 to 4,130,875 pounds in 1933, that area again yielded the largest output of any Alaska district. Southeast Alaska held second place, with an output of 3,874,703 pounds, as compared with 2,680,825 pounds in 1932. The Scotch-cured herring output in Prince William Sound increased from 2,930,750 pounds in 1932 to 3,046,125 pounds in 1933, and in the Aleutian Islands area from 1,551,250 pounds to 1,589,250 pounds. Small quantities of cured herring also were prepared at Chignik and Golovin Bay. No production has been reported from Cook Inlet since 1928.

It was said that much larger catches of herring might have been taken in the Kodiak area if the operators had gone into Shelikof Strait for the fish instead of waiting for them to come into Malka Bay. The operation of 12 or more purse seine boats in outer Malina Bay probably broke up the schools and hindered them from entering Malka Bay.

In the Aleutian Islands area large schools of herring appeared early in June, and the first commercial catches were made July 3, a week earlier than in the previous year. The first fish were of better quality than the later run, which is unusual.

In southeast Alaska 19 concerns handled herring in 1933, as compared with 18 in the previous year. Of these, 5 were cold-storage plants handling frozen herring for bait, and 7 operated pounds to provide fresh bait herring to the halibut fleet. Six concerns engaged in the saltery and reduction business as follows:

Arentsen & Co	Big Port Walter.
Buchan & Heinen Packing Co	Port Armstrong.
Chatham Strait Fish Co	New Port Walter.
Northwestern Herring Co	Port Conclusion.
Port Herbert Packing Co., Inc	Port Herbert.
Storfold & Grondahl Packing Co	Washington Bay.

Sixteen concerns engaged in the herring fishery in central Alaska, all of whom prepared pickled herring, while 3 also produced meal and oil, and 1 a fair quantity of bait herring. The more important operators in the district were as follows:

Salteries:	
Alaska Fisheries Co. (floating)	Kodiak.
Apex Fish Co	Iron Creek.
Blue Island Packing Co	Blue Fox Bay.
Buchan & Heinen Packing Co	Kodiak.
David Buvick	Shuyak Strait.
Jacobson Bros	Iron Creek and Prince William Sound.
Johnson Fisheries Co	Thumb Bay and Port Williams.
Oceanic Fisheries, Inc. (floating)	Kodiak Island and Prince William Sound.
San Marco Fish Co. (floating)	Kodiak Island.
Sword & Hofstad (floating)	Do.
United Alaska Herring Co. (floating)	Do.
Saltery and reduction plants:	
Chatham Strait Fish Co	Crab Bay.
Evans Bay Packing Co	Port Benny.
Siberian Fish & Cold Storage Co	Port Ashton.

The chief operators in the western district were the following, all of whom produced Scotch-cured or Norwegian-cured herring:

Austnes & Rod	Unalaska.
Campbell & Dougal	Dutch Harbor.
Ed Jacobsen & Co	Do.
Northwestern Herring Co	Do.
Olsen & Kangas	Do.
Peterson & Jorgensen	Do.
Polar Packing Co	Unalaska.
John A. Rockas	Dutch Harbor.

Biological studies of the Alaska herring were continued by Dr. George A. Rounsefell, assisted by Edwin H. Dahlgren, in southeast Alaska.

STATISTICAL SUMMARY

Nine hundred and eighty-eight persons engaged in the herring industry in 1933, as compared with 819 in 1932. The number of plants increased from 27 to 31. Products of the fishery were valued at $1,402,194, an increase of $229,036, or approximately 20 percent over 1932, when the total value was $1,173,158. Scotch-cured herring decreased from 12,793,225 pounds, valued at $618,880, in 1932, to 12,651,328 pounds, valued at $586,331, or about 1 percent in quantity and 5 percent in value. Herring for bait decreased from 6,486,815 pounds, valued at $47,942, to 4,471,890 pounds, valued at $38,509, or 31 percent in quantity and 20 percent in value. Meal increased about 15 percent in quantity and 52 percent in value, and oil increased 24 percent in quantity and 54 percent in value.

Persons engaged, wages paid, and operating units, Alaska herring industry, 1933

Item	Southeast Alaska	Central Alaska	Western Alaska	Total
PERSONS ENGAGED				
Fishermen:				
Whites	230	126	25	381
Natives	1	13	11	25
Total	231	139	36	406
Shoresmen:				
Whites	212	259	27	498
Natives		11	37	48
Chinese		1		1
Japanese		2		2
Total	212	273	64	549
Transporters:				
Whites		21	8	29
Natives			4	4
Total		21	12	33
Grand total	443	433	112	988
Wages paid shoresmen	$79,123	$71,879	$12,469	$163,471
Wages paid transporters		$6,741	$1,638	$8,379
OPERATING UNITS				
Plants:				
Shore	6	11	8	25
Floating:				
Power vessel		1		1
Net tonnage		1,597		1,597
Sailing vessels		1	1	2
Net tonnage		1,068	328	1,396
Scows		3		3
Total plants operated	6	16	9	31
Vessels:				
Power, over 5 tons	35	24	3	62
Net tonnage	1,116	653	104	1,878
Launches	2	3	3	8
Power dories			3	3
Gill-net boats			12	12
Seine skiffs	23	19		42
Other rowboats and skiffs	20	17	1	38
Lighters and scows	2	1		3
Pile drivers	1	1		2
Apparatus:				
Purse seines	36	20		56
Fathoms	5,922	3,163		9,085
Gill nets		1	63	64
Fathoms		40	2,206	2,246
Pound seines	8	8		16
Pounds	4	12		16

Products of Alaska herring industry in 1933

Item	Southeast Alaska		Central Alaska		Western Alaska		Total	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Fresh, for bait	2,413,220	$21,232	562,300	$5,014			2,975,520	$26,246
Frozen, for bait	1,496,370	12,263					1,496,370	12,263
Pickled, for food:								
Scotch cure	3,874,703	174,284	7,177,000	338,065	1,599,625	$73,982	12,651,328	586,331
Norwegian cure	31,250	1,750	6,000	450	253,700	11,819	290,950	14,019
Roused for food (bloater stock)					509,790	17,474	509,790	17,474
Spiced	1,000	125					1,000	125
Dry salted					54,200	2,020	54,200	2,020
Meal	17,534,860	277,611	4,496,000	71,911			22,030,860	349,522
Oil	[1] 18,821,798	318,797	[2] 4,464,360	75,397			[3] 23,286,158	394,194
Total	44,173,201	806,062	16,705,660	490,837	2,417,315	105,295	63,296,176	1,402,194

[1] 2,509,573 gallons. [2] 595,248 gallons. [3] 3,104,821 gallons.

HALIBUT

The cooperation of a majority of the American fleet in a program for the control of production during a large part of the season was of material benefit to the halibut industry. Under this program, catch limits per man were prescribed for vessels operating in the different areas, and the vessels were assigned dates on which to make port with their fares. This resulted in shorter trips, an excellent quality of fish, and a more even distribution of the market supply, eliminating to a large extent the overconcentration of stocks so frequently brought about by unrestricted fishing. These factors had a direct influence on prices, which averaged for the year approximately 40 percent higher than for 1932.

The fishermen gave greater attention than in 1932 to the saving of halibut livers, resulting in a substantial increase in the quantity sold and a larger profit to the fishermen, inasmuch as the prices advanced about 25 percent. It is estimated that for each 65 pounds of halibut landed there is landed about 1 pound of halibut liver.

In accordance with amended regulations of the International Fisheries Commission, the halibut-fishing season opened on February 1. As in the preceding year, halibut were abundant on the fishing grounds. The catch limit for area no. 2 was reached in August, and the season was closed there on August 25; area no. 3, to the westward, remained open through October 26.

Biological and statistical studies of the Pacific halibut were continued by the International Fisheries Commission under the direction of Dr. William F. Thompson. The schooner *Eagle* was chartered for field work and was operated in the Gulf of Alaska for about 10 weeks at the beginning of the year. The Canadian schooner *Capella I* was used also by the commission for investigational work in the vicinity of Queen Charlotte Islands.

STATISTICAL SUMMARY

There were 569 persons engaged in the halibut industry in Alaska in 1933—an increase of 110 from the number reported for the preceding year, and the products totaled 14,068,911 pounds, valued at

$726,362. This output represents the total fares of the Alaska halibut fleet, which comprises all American vessels landing more than one-half of their catch in Alaska or British Columbia ports rather than in the States. Landings of halibut in Alaska totaled 6,779,768 pounds, valued at $316,310. In 1932 the landings of the Alaska fleet were 13,552,296 pounds, valued at $493,052, while landings in Alaska totaled 4,562,988 pounds, valued at $134,652. Thus the increase in fares of the Alaska fleet was 516,615 pounds, or approximately 4 percent in quantity and 47 percent in value, while landings at Alaska ports increased 2,216,780 pounds, or about 49 percent in quantity and 135 percent in value over the preceding year.

These statistics were compiled from data collected by the International Fisheries Commission and by Bureau agents.

Persons engaged, wages paid, and operating units, Alaska halibut industry, 1933

Items	Total	Items	Tota
PERSONS ENGAGED		OPERATING UNITS	
Fishermen: Whites	518	Vessels:	
Shoresmen:		Power, over 5 tons	86
Whites	48	Net tonnage	1,578
Natives	3	Launches	27
		Dories	86
Total	51	Skates of lines	2,341
Grand total	569		
Wages paid shoresmen	$15,698		

Products of the Alaska halibut fishery in 1933

Products	Southeast Alaska		Central Alaska		Total	
	Pounds	Value	Pounds	Value	Pounds	Value
Fresh (including local)	8,260,476	$415,833	22,061	$1,790	8,282,537	$417,623
Frozen	5,786,374	308,739			5,786,374	308,739
Total	14,046,850	724,572	22,061	1,790	14,068,911	726,362

COD

Operations in the cod industry in Alaska in 1933 showed a marked increase as compared with the previous year. Twenty-eight whites and 7 natives were reported engaged in the fishery carried on from shore stations, a gain of 11 over the number employed in 1932. These fishermen operated chiefly in the Shumagin Islands region and in the vicinity of Unalaska. Products of the shore fishery were as follows: 82,430 pounds of dry-salted cod, valued at $2,417; 224,425 pounds of pickled cod, valued at $7,365; 31,220 pounds of stockfish, valued at $3,085; and 400 pounds of tongues, valued at $40—a total of 338,475 pounds, valued at $12,907, as compared with 197,263 pounds, valued at $5,583, in 1932.

Five vessels, the same number as in 1932, comprised the Bering Sea offshore fleet, the products of which are not included with the Alaska fisheries output because the vessels operate from and land their fares in ports of the Pacific Coast States. Of these vessels, the *Sophie Christenson* (570 tons) was operated by the Pacific Coast Codfish Co.; the *Wawona* (413 tons) and the *Azalea* (365 tons) by the Robinson Fisheries Co.; and the *Louise* (328 tons) and *William H. Smith* (496 tons) by the Union Fish Co. This is the first time since 1930 that the *Azalea* engaged in the Bering Sea cod fishery. The Union Fish Co.'s vessel *Beulah* was not operated in Alaska this year. Products of the offshore fishery were 4,860,069 pounds of dry-salted cod, valued at $163,961, and 30,400 pounds of tongues, valued at $2,640—a total of 4,890,469 pounds, valued at $166,601, as compared with 3,645,655 pounds, valued at $127,458, in 1932. The offshore fishery employed 196 persons, or 61 more than in the previous year.

WHALES

The Port Hobron plant of the American Pacific Whaling Co. was again the only whaling station operated in Alaska. Three steam whalers were used, and employment was given to 89 whites, 15 natives, and 1 Japanese. The number of whales taken was 182, consisting of 61 finbacks, 114 humpbacks, 3 sperm, 1 sulphur-bottom, 1 right, and 2 California gray whales.

The products of the whale fishery were 301,350 gallons of whale oil, valued at $53,066; 11,200 gallons of sperm oil, valued at $2,150; 310 tons of fertilizer from meat, valued at $9,320; and 207 tons of bone fertilizer valued at $4,453—a total value of products of $68,989, as compared with $91,133 in 1932.

CLAMS

An outstanding feature of the clam industry in Alaska in 1933 was the increased importance of the Cook Inlet area as a producing center, the pack from that district representing approximately 42 percent of the total output. About 55 percent of the clam products came from the Prince William Sound district, and the remaining 3 percent from the Kodiak area and southeast Alaska.

The sharp decline in the total output as compared with that for the previous year may be attributed partly to the 3-weeks strike of the clam diggers in the Cordova region in May, and partly to the fact that two of the larger plants—that at Kukak Bay, operated in 1932 by the Pioneer Packing Co., and the plant of the Strand-Jensen Fisheries Co. at Cordova—were closed in 1933.

Employment was given to 687 persons, of whom 611 were whites, 69 natives, 6 Filipinos, and 1 Japanese. The output consisted of 40,414 cases, containing 1,045,800 pounds (1,041,816 pounds of razor clams, and 3,984 pounds of butter clams), and 50 dozen clams in the shell, with a total value of $246,338. Of the canned product, 583,770 pounds were from the vicinity of Cordova, 435,294 pounds from Cook Inlet, 22,752 pounds from the Kodiak district, and 3,984 pounds from southeast Alaska. The total output shows a decrease of 40 percent in quantity and 45 percent in value from that for 1932, when clam products amounted to 1,757,016 pounds, valued at $447,368.

Products of the Alaska clam industry in 1933

Item	Cases	Pounds	Value
Minced:			
½-pound cans (48 to case)	28,875	693,000	$173,238
10-ounce cans (48 to case)	10,838	325,140	68,327
1-pound cans (48 to case)	25	1,200	200
20-ounce cans (24 to case)	100	3,000	570
Whole:			
½-pound cans (48 to case)	116	2,784	540
10-ounce cans (48 to case)	78	2,340	667
1-pound cans (48 to case)	382	18,336	2,771
Total	40,414	1,045,800	246,313
Fresh, in shell: 50 dozen		120	25
Grand total		1,045,920	246,338

SHRIMP

Three companies in southeast Alaska—the Alaskan Glacier Sea Food Co. at Petersburg, and the Reliance Shrimp Co. and Stikine Sea Food Co. at Wrangell—engaged in the shrimp industry in 1933, and in the central district the Northern Seafood Co. at Cordova again prepared a limited quantity of shrimp meat in connection with its crab fishery operations.

The number of persons employed in the industry was 139, of whom 19 were whites, 89 natives, 1 Chinese, 21 Japanese, 7 Filipinos, and 2 Mexicans. Products consisted of 317,012 pounds of shrimp meat, valued at $102,101, and 2,040 pounds of fresh shrimp in shell, valued at $281, a total of 319,052 pounds, valued at $102,382. Comparable figures for 1932 show a production of 301,786 pounds, valued at $114,136.

CRABS

Operations in the crab fishery, particularly with respect to the production of canned crabs, showed a marked expansion as compared with other recent years. Four concerns engaged in the industry in southeast Alaska—the Alaska Fisheries, Inc., a new outfit, at Hood Bay; the Northern Sea Food Co., at Petersburg; the Stikine Sea Food Co., primarily in the shrimp business, at Wrangell; and O. H. Wood, at Hoonah. In the central district, also, there were four operators—the Alaska Sea Products, Inc., the Gulf Packing Co., and the Northern Sea Food Co., at Cordova; and S. E. Smith, at Hartney Point, whose production of crabs was incidental to the clam industry.

Employment was given to 85 whites, 19 natives, and 1 Mexican. Products consisted of 90,360 pounds of cold-packed meat, valued at $19,634; 1,863 dozen crabs in the shell, valued at $1,616; and 421,536 pounds canned (1,450 cases of 1-pound cans and 14,664 cases of ½-pound cans, 48 cans to the case), valued at $134,330. The total value of products in 1933 was $155,580, as compared with $90,954 in 1932, an increase of 71 percent.

JAPANESE VESSELS IN BERING SEA

Operations of Japanese floating crab canneries in Bering Sea, which have been carried on there for four successive seasons, were on a somewhat larger scale in 1933 than in the previous year. About the middle of May the cannery vessels *Shoheo Maru* and *Taihoku Maru* were observed with their tenders and small fishing boats operating offshore from Amak Island and Nelson Lagoon, respectively. Later they moved farther east to the vicinity of Cape Seniavin. In June the floating cannery *Kasada Maru* was seen fishing to the north of Nelson Lagoon, and in the early part of August the *Shinano Maru*, with the trawler *Kokusai Maru*, was anchored about 11 miles northeast of St. Paul Island, its crab nets covering a wide area. All the nets used by the Japanese fishermen were set well outside of the 3-mile limit.

In addition to the floating canneries, the scouting ship *Hakuho Maru*, of the Department of Agriculture and Forestry, made a cruise along the Aleutian Islands in June for the purpose of investigating the migration route of fur seals. It left Dutch Harbor on June 26 to return to Japan.

The Japanese Government vessel *Hakuyo Maru*, of the Imperial Fisheries Institute of Tokyo, was also in Bering Sea. Besides the crew of 44 men and 15 officers, there were 32 graduating seniors aboard. The vessel is equipped with means to can fish, and it was said that the students had canned some salmon during the cruise. On August 4 the *Hakuyo Maru* anchored off East Landing, St. Paul Island, and the captain and a party of students went ashore and visited the Reef fur-seal rookeries. The vessel stopped at Dutch Harbor the following day and departed on August 9.

TROUT

The production of trout was on a limited scale and was incidental to other branches of the fishery. The products were as follows. Dolly Vardens, 29,322 pounds fresh, valued at $1,497; 265 pounds frozen, valued at $14; and 1,500 pounds dried, valued at $30; steelheads, 9,268 pounds frozen, valued at $424. The total output of both species was 40,355 pounds valued at $1,965, as compared with 12,346 pounds valued at $942 in 1932.

MISCELLANEOUS FISHERY PRODUCTS

Several species of fish of minor commercial importance are taken in small quantities, chiefly in connection with the halibut fishery, and are landed at ports of Alaska and British Columbia and at Seattle. Such products landed in Alaska in 1933 were as follows: Sablefish, 8,990 pounds fresh, valued at $271; 92,705 pounds frozen, valued at $4,134; and 1,400 pounds pickled, valued at $100; rockfish, 428 pounds fresh, valued at $10, and 3,105 pounds frozen, valued at $109; flounders, 75,000 pounds fresh, valued at $1,125; and smelt, 500 pounds fresh, valued at $50.

FUR-SEAL INDUSTRY

PRIBILOF ISLANDS

GENERAL ADMINISTRATIVE WORK

Sealing activities at the Pribilof Islands in 1933 resulted in the taking of 54,550 skins, of which 44,448 were obtained on St. Paul Island and 10,102 on St. George Island. On St. Paul Island 35,746 sealskins were blubbered in the course of curing operations. Three-year-old males constitute the class of animals from which the bulk of the killings were made, a sufficient number being reserved to maintain the breeding quota in subsequent years.

Incidental to the sealing activities were the care of the natives living on the islands as wards of the Government, the upkeep and improvement of the villages and of the central plants for curing and packing sealskins, the construction of roads to facilitate delivery of skins from the rookeries to the plants, and the utilization and care of foxes and reindeer, which occupy positions of importance in the economic development of the islands.

Transportation of the annual shipment of supplies to the Pribilofs and of sealskins to Seattle was accomplished through the cooperation of the Navy Department in the detail of the U.S.S. *Vega* for this work. Additional transportation of incoming and outgoing passengers and freight was furnished by the Bureau's motor vessel *Penguin* on several voyages to and from Seattle.

A regular patrol of the North Pacific Ocean and Bering Sea during the migration of the seals and their sojourn in these waters was maintained by vessels of the United States Coast Guard. Other services also were rendered by these vessels in connection with the Bureau's work at the Pribilof Islands.

For the first time since the treaty of July 7, 1911, for the preservation of fur seals in the North Pacific Ocean became effective, Great Britain in 1933 elected to take delivery of its share of the sealskins taken on the Pribilof Islands. Accordingly, these skins were delivered to a representative of the Canadian Government at Seattle in August. Heretofore that Government has accepted 15 percent of the net proceeds of sale in lieu of a share of the skins.

Two public auction sales of sealskins were held at St. Louis, Mo. in 1933. All the skins sold had been taken in prior years, and 15 percent of the net proceeds was paid to each of the Governments of the Dominion of Canada and of Japan, as provided by law. In December the United States received from Japan 170 sealskins as its share of the killings from the Japanese seal herd on Robben Island in 1933.

TRANSPORTATION OF SUPPLIES

On July 24 the U.S.S. *Vega* sailed from Seattle, Wash., for the Pribilof Islands with 1,069 tons of general supplies, 1,304 tons of coal, 139,306 board feet of lumber, and 110 bundles of shingles. The vessel arrived at the islands on August 1, and the discharge of cargo and the loading of the season's take of sealskins were completed in 10 days. In addition to 54,550 fur-seal skins, the outgoing cargo included a few tons of miscellaneous items. The *Vega* left for Seattle on August 11 and arrived there on August 20.

The Bureau's vessel *Penguin* delivered five minor shipments of supplies to the Pribilof Islands during the year.

POWER VESSEL "PENGUIN"

At the beginning of the year the *Penguin* was en route from Seattle to the Pribilof Islands with a full cargo of supplies, which was discharged early in January. During the next 2 months the vessel served as a tender between Unalaska and the islands, chiefly in the delivery of mail and perishable foodstuffs. On March 10 it sailed for Seattle with 8 passengers, 26 cases of fox skins, and 119 empty oil drums, and arrived there on March 22.

The *Penguin* left Seattle on April 20 with a full cargo of freight and arrived at St. Paul Island on May 3. The return voyage to Seattle began on May 24 and ended on June 2. On its next trip to the Pribilofs, from June 10 to June 20, the vessel had 26 passengers aboard and carried 165 tons of supplies in the hold and 2 power launches on deck. The return trip to Seattle covered the period from July 30 to August 10, a call being made en route at Afognak, where six Bureau employees from the fish-cultural station were taken aboard. Twenty-one passengers for the Bureau from the Pribilofs, of whom 17 were employees of the Fouke Fur Co. who had gone there in June as sealing assistants, were returned to Seattle at this time.

While the *Penguin* was proceeding through Seymour Narrows on August 8 against a strong tide, the steering gear gave way, leaving the vessel at the mercy of the tidal currents. Fortunately, the halibut fishing boat *Bernice*, of Seattle, northbound through the Narrows, answered the call for assistance and rendered valuable aid in towing the disabled craft to a safe anchorage in Deepwater Bay, where temporary repairs were made, permitting the *Penguin* to resume its voyage to Seattle. After permanent repairs of the steering gear were completed, the vessel sailed on August 23 for the Pribilof Islands with nine passengers and miscellaneous cargo, and arrived there on September 5.

Nine Bureau employees and a small lot of freight were aboard the *Penguin* when it left the islands on September 11, and additional employees were picked up en route south as follows: 1 at Unalaska, 2 at Chignik, and 3 at Kodiak. An employee of the United States Coast Guard Service was added to the passenger list at Ketchikan.

While running cautiously on her course through thick weather, the *Penguin* collided with the gas boat *Tuscan*, 18 tons net, plying between Ketchikan and Hyder under a mail contract, at 3:40 a.m. September 21, near Bold Island in Revillagigedo Channel, about 12 miles southeast of Ketchikan, damaging the starboard quarter of the *Tuscan*. The disabled boat was towed to Ketchikan by the *Penguin*, and a report of the accident was made to the local customs officials. Thereafter the voyage was continued, and the vessel arrived at Seattle on September 25. Subsequently a libel suit was filed by the owners of the *Tuscan* in the United States District Court at Ketchikan, claiming damages to the vessel, salvage charges, and loss of her next mail trip, amounting to $6,800. The case was tried in March 1934, and was dismissed, as negligence on the part of the *Penguin* was not shown.

The final cargo of the year for the Pribilof Islands was shipped on the *Penguin* from Seattle on October 10 and reached its destination on October 25. On the return voyage, which began October 30 and ended November 11, 12 passengers from the islands and 2 Bureau employees from Karluk were brought to Seattle.

At various times during the year the *Penguin* was used in the transportation of natives from villages on the Alaska Peninsula and the Aleutian Islands who were employed as laborers in the sealing activities of the Bureau. In July, it transported Commissioner Bell and his party of five from Bristol Bay to St. Paul Island and thence to Unalaska. Additional service was performed for the Navy Department in the movement of employees and small lots of supplies to the islands.

The *Penguin* was also used on February 14 to rescue Bishop Antonin, of the Russian Greek Orthodox Church in Alaska, who was a survivor of the wreck of the *Umnak Native* in Inanudak Bay, Umnak Island, on January 24, when 11 lives were lost.

The cruises of the *Penguin* in 1933 aggregated 27,882 nautical miles.

ROADS

St. Paul Island.—Road construction work was continued in 1933 by an extension of 1⅛ miles to the Northeast Point highway, including turn-outs for passing and branches to Lukanin and Kitovi rookeries. A good road to Zapadni, much needed because of the larger number of sealskins now being taken at that point, was commenced and more than 7,000 feet was completed. Further construction will be pushed as rapidly as conditions permit. Roads in the village to the extent of 1,200 feet were also reconditioned.

St. George Island.—Part of the plank road to North rookery was surfaced with scoria, and roads east and west of the village were improved in like manner. Grading of the east road for an additional 1,000 feet was carried on and is now in condition for scoria, the most serviceable material on the island for road building. A new approach to the village dock also was graded and surfaced, thus greatly facilitating the handling of cargo between the dock and the warehouses.

BUILDINGS

St. Paul Island.—The dock at the west landing, 80 by 100 feet, was completed, which, with the dock at the east landing, makes possible the discharging of cargo at any stage of the tide without interruption, except by high winds, and constitutes a major improvement in providing adequate dockage for scows used in the transfer of freight from and to the supply vessels. Boatways at the east landing were also built this year.

Cement foundations for 3 dwellings for natives were constructed, and the bunk house for blubberers, comprising an assembly room, bedrooms for 36 men, 6 shower baths and toilets, and equipped with a hot-water heating plant, was completed early in the season.

Increased facilities for the cooling of sealskins were provided in washhouse B by the installation of 10 new tanks, leaving space for 5 additional tanks to be supplied as required. The present equipment consists of 12 tanks, 2 of which are old, the combined capacity affording cooling space for 6,700 skins at one time.

A cement floor, 54 by 100 feet, was laid in the garage, and electrical equipment was improved by the installation of a 5-kw unit to replace the worn-out Edison batteries.

St. George Island.—A cement foundation and basement framework for a new schoolhouse were constructed early in the season, but lack of material prevented completion of the building this year.

The watchmen's house at Zapadni was replaced with a new building, which also provides housing for the men who may be engaged annually in sealing and foxing activities at that point.

The water supply of the village, being inadequate for the needs of the community, was augmented by the addition of a 40,000-gallon tank built out of staves salvaged from several tanks that collapsed on St. Paul Island years ago.

New electrical equipment was provided by the purchase and installation of a 2-kw automatic unit and a 12-kw manual controlled unit. The smaller unit supplies current for the lighting of the dwellings of the white personnel on the island, while the larger unit produces enough current to light all the houses of the natives.

NATIVES

CENSUS

On December 31, 1933, the total native population on St. Paul Island was 242, including 12 persons temporarily absent from the island, of whom 5 were on St. George Island, 1 in Seattle, and 6 in Unalaska. Births numbered 15, deaths 3, and permanent departures 3, leaving a net increase in population of 9.

On the same date, the census of St. George Island showed a population of 157 natives, including one who was temporarily residing elsewhere. The net increase for the year was 4, there being 8 births and 4 deaths in 1933.

The total population on both islands at the end of 1933 was 399, an increase of 13 over the total for 1932.

MEDICAL SERVICE

The Pribilof Islands were provided with medical service by the employment of two physicians, one for each island. Dental service was also given to the natives for the greater part of the year, but due to a shortage of funds the dentists had to be released, although much remained to be done. Aside from ailments caused by poor teeth, the health of the natives and the sanitary conditions on both islands were good.

SCHOOLS

Due to the untimely resignation on September 10, 1932, of the school-teachers on St. Paul Island, school was not opened until other teachers reached the island on January 7, 1933. It was closed on May 12, after a term of 4 months. The enrollment in the junior school was 15 boys and 18 girls, and in the senior school 16 boys and 13 girls, the total for both schools being 62, or approximately one-fourth of the native population of the island.

The school year on St. George Island opened September 19, 1932, and closed May 11, 1933, the opening date having been delayed 2 weeks by an epidemic of influenza which occurred in the early part of September. Ten boys and 11 girls attended the senior school, and 10 boys and 8 girls were enrolled in the junior school, a total of 39 children in both branches of the school, or 25 percent of the entire native population.

SAVINGS ACCOUNTS

The Commissioner of Fisheries is the custodian of certain savings of Pribilof Islands natives, which accounts are held in the bank of the Washington Loan & Trust Co., Washington, D.C. Interest is paid on these savings at the rate of 3 percent, compounded semi-annually. Four accounts were closed and one was transferred this year. The following statement shows in the aggregate the condition of these accounts on December 31, 1933:

On hand Jan. 1, 1933	$6,915.22
Interest earned from Jan. 1 to Dec. 31, 1933	186.73
	7,101.95
Withdrawn by natives	980.22
On hand Dec. 31, 1933	6,121.73

The following statement shows the amount of money in the individual accounts:

Funds of the Pribilof Islands natives in the custody of the United States Commissioner of Fisheries as trustee, Dec. 31, 1933

Gromoff, Iuliania	$370.56
Kochutin, Alexandra	2,876.15
Kozloff, Marina	124.44
Kozloff, Raisa	66.43
Lestenkof, Michael	393.85
Merculief, Alexandra	115.62
Merculief, Daniel	478.47
Merculief, Elizabeth	$66.64
Merculief, Erena	703.83
Merculief, George	101.54
Merculief, Tatiana	633.36
Pankoff, Agrippina	190.84
Total	6,121.73

PAYMENTS FOR TAKING FUR-SEAL SKINS

The natives of the Pribilof Islands are divided into classes according to their ability to perform definite work in the killing and skinning of seals. Six classifications were made, 5 of men and 1 of boys, speed and skill in removing the skins being the determining factor in the personnel of each class. The most experienced and skillful workers were graded as first-class men, while those less experienced and skilled were placed in the lower classes. Boys were employed as apprentices. Advancement through the several grades is governed by the degree of proficiency attained in the specialized work each man is required to perform.

Payments were made at the rate of 50 cents per skin for the total number of skins taken in the season upon the allocation of a definite number of skins per man in each class. In 1933, St. Paul Island produced 44,448 skins and St. George Island 10,102 skins, resulting in a monetary return of $27,275 to the six classes of workmen. Additional compensation amounting to $280 was paid to 4 foremen and 4 mess attendants, making a gross income to the natives of $27,555 on account of sealing operations. The details of these payments are shown in the following table:

Payments to Pribilof Islands natives for taking fur-seal skins, calendar year 1933

Classification	St. Paul Island			St. George Island		
	Number of men	Share of each	Total	Number of men	Share of each	Total
First class	29	$490.00	$14,210.00	27	$150.00	$4,050.00
Second class	14	392.50	5,495.00	3	112.50	337.50
Third class	4	281.00	1,124.00	4	87.50	350.00
Fourth class	5	208.50	1,042.50	4	64.00	256.00
Fifth class	5	50.00	250.00	2	25.00	50.00
Boys' class	5	20.50	102.50	1	7.50	7.50
Foreman (additional compensation)			60.00			55.00
Do			40.00			45.00
Mess attendants, 4			80.00			
Total	62		22,404.00	41		5,151.00

PAYMENTS FOR TAKING FOX SKINS

The trapping of foxes by 55 natives on St. Paul Island and 39 on St. George Island in the winter of 1932–33 resulted in the taking of 271 and 872 skins on the respective islands. The trappers were paid $4.50 per skin, or a total of $5,143.50.

FUR SEALS

KILLINGS

Forty-three drives of seals from the hauling grounds to the killing fields were made on St. Paul Island, from which 44,448 seals were killed. At the same time 35 drives on St. George Island produced 10,102 seals for killing. The following table gives the details of these operations.

Seal killings on Pribilof Islands in 1933

ST. PAUL ISLAND

Date	Serial no. of drive	Hauling ground	Skins secured
June 3	1	Sea Lion Rock (Sivutch)	121
13	2	Reef and Gorbatch	278
17	3	Tolstoi	87
19	4	Zapadni and Little Zapadni	173
20	5	Polovina	62
21	6	Vostochni and Morjovi	491
22	7	Tolstoi and Lukanin	174
23	8	Zapadni and Little Zapadni	155
24	9	Reef and Gorbatch	1,338
25	10	Polovina and Little Polovina	132
26	11	Vostochni and Morjovi	981
27	12	Tolstoi, Lukanin, and Kitovi	227

Seal killings on Pribilof Islands in 1933—Continued

ST. PAUL ISLAND—Continued

Date	Serial no. of drive	Hauling ground	Skins secured
June 28	13	Zapadni and Little Zapadni	484
29	14	Reef and Gorbatch	1,512
30	15	Polovina and Little Polovina	416
July 1	16	Vostochni and Morjovi	1,790
2	17	Tolstoi, Lukanin, and Kitovi	441
3	18	Zapadni and Little Zapadni	1,348
5	19	Polovina and Little Polovina	665
6	20	Reef and Gorbatch	3,543
7	21	Vostochni and Morjovi	1,819
8	22	Tolstoi, Lukanin, and Kitovi	688
9	23	Zapadni and Little Zapadni	1,995
10	24	Reef and Gorbatch	2,863
11	25	Polovina and Little Polovina	759
12	26	Vostochni and Morjovi	2,591
13	27	Tolstoi, Lukanin, and Kitovi	539
14	28	Zapadni and Little Zapadni	1,215
15	29	Reef and Gorbatch	1,915
16	30	Polovina and Little Polovina	644
17	31	Vostochni and Morjovi	2,081
18	32	Tolstoi, Lukanin, and Kitovi	688
19	33	Zapadni and Little Zapadni	1,196
20	34	Reef and Gorbatch	1,032
21	35	Tolstoi, Lukanin, Kitovi, Polovina, and Little Polovina	819
22	36	Vostochni and Morjovi	1,172
23	37	Reef and Gorbatch	1,962
24	38	Zapadni, Little Zapadni, Tolstoi, Lukanin, and Kitovi	1,080
25	39	Vostochni, Morjovi, Polovina, and Little Polovina	1,219
26	40	Reef and Gorbatch	1,095
27	41	Zapadni, Little Zapadni, Tolstoi, Lukanin, and Kitovi	899
28	42	Vostochni, Morjovi, Polovina, and Little Polovina	816
29	43	Reef and Gorbatch	993
		Total	44,448

ST. GEORGE ISLAND

Date	Serial no. of drive	Hauling ground	Skins secured
June 9	1	North	16
14	2	do	50
16	3	East	61
19	4	North	48
20	5	East	39
23	6	North and Staraya Artil	296
24	7	East	161
25	8	Zapadni	77
27	9	North and Staraya Artil	365
28	10	East	126
29	11	Zapadni	58
July 1	12	North and Staraya Artil	638
2	13	East	366
3	14	Zapadni	123
5	15	North and Staraya Artil	884
6	16	East	448
7	17	Zapadni	229
9	18	North and Staraya Artil	956
10	19	East	370
11	20	Zapadni	169
13	21	North and Staraya Artil	604
14	22	East	476
15	23	Zapadni	220
17	24	North and Staraya Artil	650
18	25	East	222
19	26	Zapadni	174
21	27	North and Staraya Artil	498
22	28	East	498
23	29	Zapadni	85
24	30	North and Staraya Artil	245
25	31	East	145
26	32	Zapadni	100
27	33	North and Staraya Artil	353
28	34	East	258
29	35	Zapadni	94
		Total	10,102

AGE CLASSES

Seals are divided into age groups according to the length of body, it having been found by repeated tests that this is the most satisfactory method of fixing the age of the animals selected for killing. These lengths have been applied to seals ranging from 1 to 6 years of age, and they constitute the gage by which the age of all male seals killed in 1933 was determined. This standard of measurement is not inflexible, however, as seals do not grow at exactly the same rate, but the variation from the accepted length of a seal of a certain age is regarded as inconsequential. The limits of the various age classes are shown in the table following:

Age classes of male seals, Pribilof Islands

Age	Length	Age	Length
	Inches		*Inches*
Yearlings	Up to 36.75	4-year-olds	46 to 51.75
2-year-olds	37 to 40.75	5-year-olds	52 to 57.75
3-year-olds	41 to 45.75	6-year-olds	58 to 63.75

Ages of seals killed on Pribilof Islands, calendar year 1933

[On basis of classification shown in preceding table]

Age	St. Paul Island	St. George Island	Total	Age	St. Paul Island	St. George Island	Total
2-year-old males	912	189	1,101	Cows [1]	36	43	79
3-year-old males	43,158	9,589	52,747	Total	44,448	10,102	54,550
4-year-old males	342	281	623				

[1] Cows unavoidably and accidentally killed or found dead.

Some of the seals recorded in the above tabulation as 2-year-olds and 4-year-olds probably were 3-year-olds, as not all male seals of a given age fall within the length limits assigned for the males of that age. As far as possible, the killings in 1933 were confined to 3-year-old males.

RESERVING OPERATIONS

No 3-year-old male seals were marked for the breeding reserve in 1933. It was evident at the close of the season that the number of adolescent males of this age class was ample to maintain in subsequent years the supply of bulls in sufficient strength to meet all breeding requirements of the herd.

COMPUTATION OF FUR-SEAL HERD

Following the procedure of other years, Supt. H. J. Christoffers again computed the number of seals in the Pribilof Islands herd at the close of the killing season of 1933. The result of this computation shows that the herd now numbers 1,318,568 seals of all ages. This is an increase of 98,607, or 8.08 percent, over the number reported in 1932. A more detailed summation of the seal census is given elsewhere in this document. The growth of the herd by component parts for 12 years is shown in the table below.

General comparison of computations of the seal herd on the Pribilof Islands 1922–33

Classes	1922	1923	1924	1925	1926	1927
Harem bulls	3, 562	3, 412	3, 516	3, 526	4, 034	4, 643
Breeding cows	185, 914	197, 659	208, 396	226, 090	244, 114	263, 566
Surplus bulls	2, 346	1, 891	2, 043	3, 558	2, 002	4, 827
Idle bulls	508	312	390	311	423	972
6-year-old males	3, 771	4, 863	8, 489	4, 105	13, 434	13, 450
5-year-old males	6, 080	10, 612	5, 132	16, 792	16, 812	16, 073
4-year-old males	11, 807	5, 710	18, 670	18, 692	17, 872	14, 448
3-year-old males	7, 459	22, 786	21, 551	21, 185	17, 189	9, 730
2-year-old males	40, 920	43, 112	45, 685	43, 515	38, 183	41, 252
Yearling males	52, 088	55, 769	59, 291	52, 091	56, 514	61, 026
2-year-old cows	46, 280	48, 801	51, 359	49, 786	44, 415	48, 186
Yearling cows	57, 413	60, 422	64, 240	57, 309	62, 175	67, 131
Pups	185, 914	197, 659	208, 396	226, 090	244, 114	263, 566
Total	604, 962	653, 008	697, 158	723, 050	761, 281	808, 870

Classes	1928	1929	1930	1931	1932	1933
Harem bulls	6, 050	7, 187	8, 312	9, 233	10, 088	10, 213
Breeding cows	284, 725	307, 491	332, 084	358, 642	387, 320	418, 299
Surplus bulls	5, 285	5, 207	3, 963	3, 291	2, 803	4, 700
Idle bulls	1, 449	1, 633	1, 899	1, 888	2, 349	2, 341
6-year-old males	12, 857	10, 399	5, 612	6, 553	8, 154	9, 335
5-year-old males	13, 001	7, 016	8, 191	10, 103	11, 669	10, 216
4-year-old males	7, 798	9, 102	11, 327	12, 966	11, 351	15, 441
3-year-old males	11, 133	13, 639	14, 871	13, 198	17, 849	18, 216
2-year-old males	49, 087	64, 354	69, 674	74, 828	81, 101	87, 662
Yearling males	65, 861	85, 381	92, 232	99, 612	107, 592	116, 195
2-year-old cows	57, 061	67, 210	72, 605	78, 410	84, 682	91, 454
Yearling cows	72, 481	85, 417	92, 247	99, 626	107, 593	116, 197
Pups	284, 725	307, 491	332, 084	358, 642	387, 320	418, 299
Total	871, 513	971, 527	1, 045, 101	1, 127, 082	1, 219, 901	1, 318, 568

FOXES

St. Paul and St. George Islands are inhabited by sizable herds of blue foxes which produce annually several hundred pelts. The care of these animals in the winter months when it is not easy for them to find natural food is one of the important activities of the islands at that season, as the feeding of prepared rations must be carried on to keep the foxes in prime condition for both trapping and breeding.

TRAPPING SEASON OF 1933–34

In the 1933–34 season there were taken 939 fox pelts, of which 914 were blue and 25 white. Two hundred and fourteen blue and 23 white pelts were taken on St. Paul Island, and 700 blue and 2 white pelts on St. George Island. There were also trapped, marked, and released for breeding stock 35 foxes on St. Paul Island and 192 on St. George Island. The breeding reserve includes also a considerable number of animals that were not captured during the season.

REINDEER

St. Paul Island.—On September 30, 1933, the reindeer herd on St. Paul Island numbered 673 animals, including the natural increase of

125 since the census of 1932 was taken, but exclusive of 11 killed for food during the year. The condition of the herd was regarded as good.

St. George Island.—The reindeer herd on St. George Island on September 30, 1933, contained 63 animals, of which 8 were the young of the season. None was used for food during the year.

FUR-SEAL SKINS

SHIPMENTS

On August 20, 1933, the U.S.S. *Vega* delivered at Seattle, Wash., the season's entire take of sealskins, aggregating 54,550 pelts, of which 46,367 were consigned to the Fouke Fur Co. at St. Louis, Mo., and 8,183, or 15 percent of the take, to a representative of the Government of the Dominion of Canada at Seattle in accordance with the provisions of the treaty of July 7, 1911.

SALES

Two public auctions of fur-seal skins from the Pribilof Islands were held at St. Louis in 1933—on May 15 and August 28, respectively—the combined total amounting to 50,097 skins. In addition, 490 sealskins taken on the Pribilof Islands were disposed of at special sales. With the following detailed statements of these sales, the sales of other fur-seal skins by the Department of Commerce for the account of the Government are included in order that the records may be complete.

Public auction sale, May 15, 1933.—At this sale 25,621 Pribilof Islands fur-seal skins, dressed, dyed, and machined, were sold for $394,303.80. One confiscated skin, dyed logwood brown, was sold for $23. In addition, 512 Japanese fur-seal skins, which were the share of the United States Government from the Robben Island killings in 1930, 1931, and 1932, were sold for a total of $1,755.75. Of these skins, 282 were dressed, dyed, and machined, dyed black, 1 was unhaired and dressed, and 229 were raw salted.

Public auction sale, August 28, 1933.—The Government disposed of 24,476 fur-seal skins at this sale, of which 24,239 were dressed, dyed, and machined and sold for $469,702.25. The remaining 237 skins were sold in the raw salted condition for $59.25.

Special sales.—Several special sales of small lots of sealskins were authorized in 1933, in accordance with which 337 black-dyed finished skins were sold for $6,759.16, and 137 brown-dyed finished skins were sold for $2,462.06. Two raw salted skins were sold for $6.70 and 14 specially prepared skins for exhibition purposes were sold for $350. The gross return from the sale of these 490 skins was $9,577.92.

The classification and selling price of all sealskins sold in 1933 for the account of the Government are shown in the following tables:

Comparative values, by sizes and grades, with percentages each size, of Pribilof sealskins sold at public auction in 1933

Classes and sales	Grade	Number	High	Low	Average	Total	Total number	Average price	Total price	Percentage
DYED BLACK										
Extra large:										
May 15	I and II	206	$25.50	$23.00	$24.33	$5,011.00	427	$20.99	$8,962.50	2.07
	Scarred, Faulty, etc	215	22.00	17.00	18.23	3,920.00				
	III	6	5.25	5.25	5.25	31.50				
Aug. 28	I and II	300	28.00	25.50	26.90	8,070.00	703	23.83	16,754.50	3.90
	Scarred, Faulty, etc	401	23.25	19.00	21.62	8,669.00				
	III	2	7.75	7.75	7.75	15.50				
Large:										
May 15	I and II	2,052	24.75	22.50	23.60	48,430.00	4,486	20.30	91,063.50	21.76
	Scarred, Faulty, etc	2,380	19.75	16.75	17.79	42,350.00				
	III	54	5.25	5.25	5.25	283.50				
Aug. 28	I and II	2,310	26.75	24.00	25.53	58,975.00	5,066	22.05	111,705.25	28.07
	Scarred, Faulty, etc	2,739	20.50	18.00	19.20	52,598.50				
	III	17	7.75	7.75	7.75	131.75				
Medium:										
May 15	I and II	5,383	18.75	16.00	17.35	93,414.75	12,878	14.75	189,898.50	62.45
	Scarred, Faulty, etc	7,320	16.25	12.75	13.06	95,610.00				
	III	175	5.25	4.75	4.99	873.75				
Aug. 28	I and II	4,880	21.25	18.50	19.95	97,380.00	10,536	16.94	178,509.00	58.38
	Scarred, Faulty, etc	5,590	15.50	13.25	14.42	80,617.50				
	III	66	7.75	7.75	7.75	511.50				
Small medium:										
May 15	I and II	809	14.25	13.00	13.32	10,773.05	2,830	10.12	28,640.80	13.72
	Scarred, Faulty, etc	1,845	10.95	9.25	9.33	17,219.25				
	III	176	4.10	3.25	3.68	648.50				
Aug. 28	I and II	860	17.25	15.00	16.23	13,957.50	1,742	14.43	25,143.00	9.65
	Scarred, Faulty, etc	860	13.25	12.50	12.81	11,015.00				
	III	22	7.75	7.75	7.75	170.50				
All classes:										
May 15							20,621	15.45	318,565.30	100.00
Aug. 28							18,047	18.40	332,111.75	100.00

Comparative values, by sizes and grades, with percentages each size, of Pribilof sealskins sold at public auction in 1933—Continued

Classes and sales	Grade	Number	High	Low	Average	Total	Total number	Average price	Total price	Percentage
DYED LOGWOOD BROWN										
Extra extra large:										
	I and II	10	26.00	24.50	25.70	257.00				
Aug. 28	Scarred, Faulty, etc.	9	19.25	19.25	19.25	173.25	20	21.89	437.75	.32
	III	1	7.50	7.50	7.50	7.50				
Extra large:										
May 15	I and II	160	21.50	20.00	20.84	3,335.00	260	18.64	4,847.50	5.20
	Scarred, Faulty, etc.	100	15.25	15.00	15.13	1,512.50				
	I and II	303	27.00	24.50	25.73	7,795.00				
Aug. 28	Scarred, Faulty, etc.	64	19.75	19.25	19.55	1,251.00	369	24.56	9,061.00	5.96
	III	2	7.50	7.50	7.50	15.00				
Large:										
May 15	I and II	950	22.00	18.75	19.34	18,377.50	1,550	17.29	26,805.00	31.00
	Scarred, Faulty, etc.	600	14.25	13.75	14.05	8,427.50				
	I and II	1,634	31.00	24.50	26.10	42,648.00				
Aug. 28	Scarred, Faulty, etc.	522	20.00	18.25	19.05	9,945.00	2,195	24.09	52,885.50	35.45
	III	39	7.50	7.50	7.50	292.50				
Medium:										
May 15	I and II	1,560	18.25	14.25	15.70	24,488.00	2,560	14.57	37,298.00	51.20
	Scarred, Faulty, etc.	1,000	13.75	11.25	12.81	12,810.00				
	I and II	2,044	25.00	20.25	22.99	46,997.75				
Aug. 28	Scarred, Faulty, etc.	900	22.00	19.00	20.05	18,042.50	3,035	21.61	65,590.25	49.02
	III	91	7.50	5.00	6.04	550.00				
Small medium:										
May 15	I and II	400	12.05	10.60	11.48	4,590.50	630	10.77	6,788.00	12.60
	Scarred, Faulty, etc.	230	9.75	9.25	9.55	2,197.50				
	I and II	291	21.00	18.00	19.08	5,551.00				
Aug. 28	Scarred, Faulty, etc.	255	15.50	15.25	15.41	3,930.00	573	16.78	9,616.00	9.25
	III	27	5.00	5.00	5.00	135.00				
All classes:										
May 15							5,000	15.15	75,738.50	100.00
Aug. 28							6,192	22.22	137,590.50	100.00
MISCELLANEOUS										
	Raw	71	.25	.25	.25	17.75				
Aug. 28	Unhaired	82	.25	.25	.25	20.50	237	.25	59.25	100.00
	Partly Unhaired	84	.25	.25	.25	21.00				

Special sales of Pribilof Islands fur-seal skins in 1933

Date	Number of skins	Description	Price per skin	Total
Mar. 31	20	Dyed black, large	$21.28	$425.60
	17	Dyed black, medium	14.01	238.17
Apr. 30	1	Exhibition skin	25.00	25.00
June 30	57	Dyed black, large	23.60	1,345.20
	83	Dyed black, medium	17.35	1,440.05
	48	Dyed logwood brown, large	19.34	928.32
	72	Dyed logwood brown, medium	15.70	1,130.40
July 30	70	Dyed black, large	23.60	1,652.00
	70	Dyed black, medium	17.35	1,214.50
	2	Raw salted	3.35	6.70
Oct. 31	8	Dyed black, large	25.53	204.24
	12	Dyed black, medium	19.95	239.40
	4	Dyed logwood brown, large	26.10	104.40
	6	Dyed logwood brown, medium	22.99	137.94
	7	do	23.00	161.00
	13	Exhibition skins	25.00	325.00
	490			9,577.92

Sale at St. Louis, Mo., May 15, 1933, of 512 fur-seal skins received from Japanese Government under treaty provisions

Number of skins	Trade classification	Price per skin	Total for lot
150	Dressed, dyed, and machined, black	$10.00	$1,500.00
132	do	1.50	198.00
1	Unhaired and dressed	.50	.50
229	Raw salted	.25	57.25
512			1,755.75

DISPOSITION OF FUR-SEAL SKINS TAKEN AT PRIBILOF ISLANDS

On January 1, 1933, there were on hand 77,638 fur-seal skins taken at the Pribilof Islands. Of these, 77,606 were at St. Louis, Mo., and 32 at Washington. In 1933 there were taken at the Pribilof Islands 54,550 fur-seal skins, of which 8,183, or 15 percent, were allotted to the Government of the Dominion of Canada in accordance with treaty provisions. Due to a miscount, one of the barrels delivered to the Canadian Government was short two skins, which will probably be found later, either among the skins that were shipped to St. Louis, Mo., or else in salt at the islands. Of the skins on hand at the beginning of the year, 50,587 were disposed of, leaving 27,051 unsold, which with the 46,367 from the 1933 take make a total of 73,418 on hand on December 31, 1933. The following tables show further details in regard to fur-seal skins taken on the Pribilof Islands, as well as details in regard to other Government-owned fur-seal skins under the control of the Department of Commerce.

Summary of Government-owned fur-seal skins in the custody of Fouke Fur Co., at St. Louis, Mo., calendar year 1933

Source	On hand Jan. 1	Receipts in 1933	Sales in 1933	On hand Dec. 31
Taken on Pribilof Islands:				
Calendar year 1931	28,270		27,969	301
Calendar year 1932	49,336		22,618	26,718
Calendar year 1933		46,367		46,367
United States' share of Japanese fur-seal skins:				
Season of 1930	172		172	
Season of 1931	170		170	
Season of 1932	170		170	
Season of 1933		170		170
Confiscated fur-seal skin	1		1	
Total	78,119	46,537	51,100	73,556

Summary of all Government-owned fur-seal skins under control of Department of Commerce, calendar year 1933

Source	On hand Jan. 1			Receipts in 1933	Disposed of in 1933		Unaccounted for [1]	On hand Dec. 31		
	Fouke Fur Co.	Washington office	Total		Sales	Delivered to Canada		Fouke Fur Co.	Washington office	Total
Taken on Pribilof Islands:										
Calendar year 1918, held for reference purposes		7	7						7	7
Calendar year 1923		3	3						3	3
Calendar year 1924		1	1						1	1
Calendar year 1929		5	5						5	5
Calendar year 1930		2	2						2	2
Calendar year 1931	28,270	[2] 14	28,284		27,969			301	[2] 14	315
Calendar year 1932	49,336		49,336		22,618			26,718		26,718
Calendar year 1933				54,550		[1] 8,181	2	46,367		46,367
Miscellaneous skins held for reference purposes		4	4						4	4
United States' share of Japanese sealskins:										
Season of 1930	172		172		172					
Season of 1931	170		170		170					
Season of 1932	170		170		170					
Season of 1933				170				170		170
Confiscated skins	1		1		1					
Total	78,119	36	78,155	54,720	51,100	8,181	2	73,556	36	73,592

[1] When the skins shipped to Canada were unpacked, the shipment was 2 skins short of the 8,183 indicated on the shipping list. Probably a miscount was made also in the skins that were shipped to St. Louis, or else 2 skins were inadvertently left in salt at the Islands. An adjustment of the skins due the Canadian Government will be made in the shipment for 1934.

[2] Skins made up into coats for display purposes.

SHIPMENT AND SALE OF FOX SKINS

On March 10, 1933, the *Penguin* sailed from St. Paul Island for Seattle with the season's catch of 1,143 fox skins. Of these, 271 were taken on St. Paul Island, and 872 on St. George Island. Reshipment from Seattle to the Fouke Fur Co., the Government's selling agent, at St. Louis, Mo., was made on March 22.

On May 15, the Government sold at public auction at St. Louis 682 blue fox skins for $19,976.50, or an average of $29.29 per skin.

At the auction sale on August 28, the Government disposed of 560 blue fox skins for $16,329.50, an average of $29.16 per skin, and 22 white fox skins for $496, an average of $22.55 per skin.

Prices at the May sale ranged from $69 for a no. I silvery pelt down to $10 for pelts graded as nos. III and IV. Comparable prices at the August sale were $82 for a no. I silvery pelt and $8.50 for nos. III and IV of the poorest quality. These prices indicate, however, an improved market for fox skins as compared with that of 1932, the advance in average price for blue fox pelts from September 26, 1932, to August 28, 1933, being 72.24 percent.

SEA-OTTER SKINS

In December 1932 the Sanditz Commission Co., St. Louis, Mo., obtained possession of 12 unauthenticated sea-otter skins which were alleged to have been found by the master of the halibut fishing boat *Northwestern* in a floating oil drum off the Barren Islands, near the entrance to Cook Inlet, Alaska. As no evidence was produced showing that these skins were lawfully possessed, they were forfeited to the Government and were sold at public auction on May 15 at St. Louis for $2,207. This was the largest seizure of sea-otter skins that had been made in many years.

FUR-SEAL PATROL

UNITED STATES COAST GUARD

Six vessels of the Coast Guard were detailed by the Secretary of the Treasury to patrol duty along the coast of Washington and Alaska during the migration of the fur seals to the Pribilof Islands. Beginning in April, the *Snohomish* guarded the seals in their northward journey from the southern boundary of Washington to Dixon Entrance; the *Tallapoosa*, from April 15 to 30, between Dixon Entrance and Kodiak, and from May 1 to 15 between Kodiak and Unimak Pass. The *Shoshone* was assigned to Bering Sea from May to July but was replaced by the *Chelan* in July, which with the *Alert* beginning in May and the *Tahoe* in June continued to patrol those waters westward to Attu until the end of the season. The *Northland* assisted in this work on its voyage to and from the Arctic Ocean, where it rendered service during the summer to the settlements on the northern coast of Alaska. This patrol was maintained under the authority of the law giving effect to the convention of July 7, 1911, for the protection of the North American fur-seal herd.

BUREAU OF FISHERIES

Two vessels of the Bureau were detailed to seal-patrol duty for a limited time in the spring of 1933. The *Brant* was operated in the vicinity of Neah Bay, Wash., from April 9 to May 12, and the *Widgeon* for approximately 1 month, beginning the middle of April, in the region of Sitka, Alaska. The aborigines carry on pelagic sealing in both of these localities during the northward migration of the seals.

SEALING PRIVILEGES ACCORDED ABORIGINES

Under the provisions of the North Pacific Sealing Convention of July 7, 1911, Indians and other aborigines dwelling on the coasts of the waters designated by the convention may take fur-seal skins under limited conditions. In 1933 there were taken and duly authenticated by officials of the respective Governments 2,076 fur-seal skins, of which 92 were taken by Indians under the jurisdiction of the United States, and 1,984 by Indians of Canada. The details are as follows:

Washington.—Twenty-nine sealskins taken by Indians of Washington were authenticated. Of these, 17 were from male seals and 12 from females. The skins were taken by Indians of La Push and Neah Bay in the months from March to May, inclusive, and were authenticated by John B. Holm, special agent of the Bureau, and by Raymond H. Bitney, superintendent of the Neah Bay Indian Agency, Neah Bay, Wash.

Alaska.—Sixty-three sealskins taken by natives of Sitka were authenticated by Bureau employees. Of these skins, 20 were from male seals and 43 from females. The seals were taken in the waters off Biorka Island in the months of May and June.

British Columbia.—An official report received by the Bureau stated that 1,984 fur-seal skins were taken by Indians of British Columbia in 1933.

JAPANESE SEALSKINS DELIVERED TO THE UNITED STATES

The treaty of July 7, 1911, for the protection of the fur seals of the North Pacific Ocean provides that the United States shall receive 10 percent of the fur-seal skins taken annually from the Japanese herd. In accordance with that provision the United States received in December 1933 from Japan 170 sealskins as its share of the take on Robben Island in that year. These skins were sent to St. Louis, Mo., to be processed and sold by the Fouke Fur Co. for the account of the Government.

COMPUTATION OF FUR SEALS, PRIBILOF ISLANDS, 1933

By Harry J. Christoffers

In order to ascertain the approximate number of killable male seals arriving at the Pribilof Islands, an annual estimate is made of the number of animals in the herd, based on observations during the year and on past experience. For the purpose of assuring that sufficient 3-year-old males are being reserved for breeding stock, it is necessary to count the number of harem and idle bulls on hand as a means of determining, as accurately as possible, the average harem for the season. It is considered desirable to maintain an average harem of from 40 to 45. Although the opinion is sometimes expressed that an average harem of 50 will answer all requirements, it is believed that this average indicates a shortage of surplus bulls and consequently a shortage of breeders for the late-arriving virgin females. Regardless of the average size of the harem, if there are not enough surplus bulls to take care of late arrivals, there is not being maintained an adequate reserve for breeding requirements.

In 1933 it seemed safe to kill 52,747 3-year-old male seals. It was apparent that there were sufficient males over 3 years old to take care of breeding requirements, making it unnecessary to reserve any 3-year-old animals while killing operations were in progress. Observations after the close of the killing season indicated that sufficient 3-year-olds remained to assure an ample breeding stock when they enter the surplus, idle, and harem bull classes. The arrival of the annual supply vessel and the consequent work of unloading cargo prevented the marking of any of these animals.

For several years prior to 1932 there was each season an unusually large increase over the previous year in the number of killable seals arriving at the islands, but this could not be expected to continue. These large increases, it is thought, were in the nature of a readjustment as a result of leaving a large reserve in 1923 and subsequent years to compensate for previous close killings. Normally, the average increase in killings would not be more than 7 or 8 percent. Any additional increase in the number of seals killed must be due to particularly favorable conditions at sea during the first 3 years of their life. As the Bureau cannot determine what natural conditions exist in any year, it is impossible to predict accurately what the take of sealskins will be.

If an average rate of growth of the herd is maintained, an unusually large increase in the number of seals taken in certain years would necessarily be followed in succeeding years by no increase at all, or even by a decrease. Undoubtedly it often happens that there may be several years with extremely good conditions at sea, followed by several years with poor conditions in respect to food or freedom from natural enemies, which would affect the mortality of the seals. Upon the basis of past experience it would seem that notwithstanding these fluctuations the number of killable seals arriving at the Pribilof Islands will gradually increase to a point where at least 100,000 may be killed annually. The actual size to which the herd may increase before natural conditions prevent overpopulation of the sea with seal life is, of course, not known.

It is interesting to note that starting with the number of 3-year-olds killed in 1918, the first year of commercial killing after the 5-year closed period, and applying a yearly increase of 8 percent, the number of 3-year-old seals to be killed in 1933 would have been 53,946. Actually, there were 52,747 3-year-old seals killed in that year.

BULLS

As in previous years, a census was taken of the harem and idle bulls. Portions of some of the larger rookeries again had to be estimated. The Sivutch rookery could not be counted, and it did not seem desirable to show any increase over the number estimated for that rookery in 1932.

The percentage increase of harem and idle bulls over 1932 was not as large as in other recent years. This would indicate that the larger breeding reserve created during and after 1923 has lowered the average harem to about the desired number.

A great many iron-branded bulls that had been reserved as 3-year-olds in 1923 were observed holding large harems. Some were seen also on the hauling grounds throughout the season. The latter no doubt were late arrivals that did not feel strong enough to fight for harem positions.

Number of harem and idle bulls, approximate ratio of idle bulls to harem bulls, and average harem, 1933

Rookery	Date	Harem bulls	Idle bulls	Total	Approximate ratio of idle bulls to harem bulls	Average harem
St. Paul Island:						
Kitovi	July 18	376	71	447	1:5	36.80
Lukanin	do	148	44	192	1:3	45.20
Gorbatch	July 15	744	143	887	1:5	47.22
Ardiguen	do	79	13	92	1:6	42.06
Reef	do	1,377	327	1,704	1:4	51.25
Sivutch (estimated)		400	85	485	1:5	53.99
Lagoon (actual count)	July 15	5	1	6	1:5	22.80
Tolstoi	July 18	951	223	1,174	1:4	43.68
Zapadni	July 19	793	177	970	1:4	50.34
Little Zapadni	do	453	93	546	1:5	44.92
Zapadni Reef	do	42	11	53	1:4	16.81
Polovina	July 16	329	102	431	1:3	43.61
Polovina Cliffs	do	279	61	340	1:5	28.16
Little Polovina	do	123	27	150	1:5	23.26
Morjovi	July 17	303	78	381	1:4	16.97
Vostochni	do	1,932	477	2,409	1:4	29.63
Total		8,334	1,933	10,267	1:4	40.94
St. George Island:						
North	July 21	683	151	834	1:5	40.70
Staraya Artil	do	467	79	546	1:6	44.92
Zapadni	July 19	161	51	212	1:3	18.39
South	do	121	4	125	1:30	5.74
East Reef	July 22	155	47	202	1:3	41.16
East Cliffs	do	292	76	368	1:4	62.38
Total		1,879	408	2,287	1:5	41.01
Total (both islands)		10,213	2,341	12,554	1:4	40.96

AVERAGE HAREM

The estimated average harem for St. Paul Island (40.94) shows an increase of 2.73 as compared with figures for 1932; for St. George Island (41.01), an increase of 1.80; and for the two islands (40.96), an increase of 2.57.

An average harem of approximately 41 indicates an ideal condition for breeding requirements on the rookeries of both islands. This should continue to result in a maximum increase in the growth of the herd. The slight increase in the average harem over 1932 was undoubtedly due to the dying off of a great many of the bulls reserved as 3-year-olds in 1923. In that year a reserve of 10,000 3-year-olds was made before the commercial killing was undertaken.

The average size of the harem has been determined on the basis of an average increase of 8 percent for the cows. Although the increase in the number of cows for each particular rookery varies considerably from year to year, the average rate of increase for the breeding grounds as a whole has been fairly constant over a period of years.

Computation of breeding cows, based on annual increase of 8 percent, and of average harem, in 1933

Rookery	Breeding cows		Harem bulls, 1933	Average harem		
	1932	1933		1933	1932	Increase (+) or decrease (−) in 1933 from 1932
St. Paul Island:						
Kitovi	12, 812	13, 837	376	36. 80	36. 29	+0. 51
Lukanin	6, 194	6, 690	148	45. 20	42. 72	+2. 48
Gorbatch	32, 630	35, 132	744	47. 22	45. 75	+1. 47
Ardiguen	3, 077	3, 323	79	42. 06	43. 96	−1. 90
Reef	65, 341	70, 568	1, 377	51. 25	48. 87	+2. 38
Sivutch	19, 994	21, 594	400	53. 99	49. 99	+4. 00
Lagoon (actual count pups)	110	114	5	22. 80	22. 00	+. 80
Tolstoi	38, 465	41, 542	951	43. 68	40. 96	+2. 72
Zapadni	36, 966	39, 923	793	50. 34	48. 70	+1. 64
Little Zapadni	18, 843	20, 350	453	44. 92	43. 52	+1. 40
Zapadni Reef	654	706	42	16. 81	15. 95	+. 86
Polovina	13, 284	14, 347	329	43. 61	35. 81	+7. 80
Polovina Cliffs	7, 274	7, 856	279	28. 16	27. 04	+1. 12
Little Polovina	2, 649	2, 861	123	23. 26	22. 26	+1. 00
Morjovi	4. 762	5, 143	303	16. 97	16. 59	+. 38
Vostochni	53, 006	57, 246	1, 932	29. 63	26. 12	+3. 51
Total	316, 961	341, 232	8, 334	40. 94	38. 21	+2. 73
St. George Island:						
North	25, 779	27, 841	683	40. 76	39. 48	+1. 28
Staraya Artil	19, 424	20, 978	467	44. 92	42. 32	+2. 60
Zapadni	2, 741	2, 960	161	18. 39	18. 40	−. 01
South	643	694	121	5. 74	6. 77	−1. 03
East Reef	5, 907	6, 380	155	41. 16	39. 12	+2. 04
East Cliffs	16, 865	18, 214	292	62. 38	53. 88	+8. 50
Total	71, 359	77, 067	1, 879	41. 01	39. 21	+1. 80
Total (both islands)	387, 320	418, 299	10, 213	40. 96	38. 39	+2. 57

PUPS AND COWS

The estimated number of cows and pups at the islands in 1933 was determined by applying an increase of 8 percent over the number computed for 1932.

The number of dead pups was determined by applying the percentage found dead on each rookery in 1922. For comparative purposes, the dead pups are included in the total number of pups.

Distribution of pups on the Pribilof Islands, Aug. 10, 1933, and comparison with distribution in 1932

Rookery	1933				1932	1933
	Living pups	Dead pups	Total pups	Percent dead pups	Total pups	Increase
St. Paul Island:						
Kitovi	13,634	203	13,837	1.47	12,812	1,025
Lukanin	6,545	145	6,690	2.17	6,194	496
Gorbatch	34,830	302	35,132	.86	32,530	2,602
Ardiguen	3,244	79	3,323	2.39	3,077	246
Reef	69,538	1,030	70,568	1.46	65,341	5,227
Sivutch	21,067	527	21,594	2.44	19,994	1,600
Lagoon (actual count)	114		114		110	4
Tolstoi	40,965	577	41,542	1.39	38,465	3,077
Zapadni	39,236	687	39,923	1.72	36,966	2,957
Little Zapadni	19,841	509	20,350	2.50	18,843	1,507
Zapadni Reef	700	6	706	.80	654	52
Polovina	14,127	220	14,347	1.53	13,284	1,063
Polovina Cliffs	7,711	145	7,856	1.85	7,274	582
Little Polovina	2,789	72	2,861	2.51	2,649	212
Morjovi	5,039	104	5,143	2.02	4,762	381
Vostochni	56,055	1,191	57,246	2.08	53,006	4,240
Total	335,435	5,797	341,232	1.70	315,961	25,271
St. George Island:						
North	27,451	390	27,841	1.40	25,779	2,062
Staraya Artil	20,437	541	20,978	2.58	19,424	1,554
Zapadni	2,927	33	2,960	1.12	2,741	219
South	682	12	694	1.72	643	51
East Reef	6,284	96	6,380	1.51	5,907	473
East Cliffs	17,943	271	18,214	1.49	16,865	1,349
Total	75,724	1,343	77,067	1.74	71,359	5,708
Total (both islands)	411,159	7,140	418,299	1.71	387,320	30,979

MORTALITY OF SEALS AT SEA

The mortality rates used for computing the number of animals in the herd are the same as were used in computing the estimate for 1932. These rates will answer all practical purposes until very abnormal conditions arise.

COMPLETE COMPUTATION

The following summary shows the methods used for computing the number of animals in the fur-seal herd of the Pribilof Islands in 1933. The total number of seals of all classes is 1,318,568, or 98,607 more than in 1932. This is an increase of 8.08 percent.

Complete computation of fur seals, Pribilof Islands, as of Aug. 10, 1933

Class	St. Paul Island	St. George Island	Total
Pups, estimated	341,232	77,067	418,299
Breeding cows, 3 years old and over, by inference	341,232	77,067	418,299
Harem bulls, counted	8,334	1,879	10,213
Idle bulls, counted	1,933	408	2,341
Yearlings, male and female, estimated:			
Females born in 1932	157,981	35,680	193,661
Natural mortality, 40 percent	63,192	14,272	77,464
Yearling females, Aug. 10, 1933	94,789	21,408	116,197
Males born in 1932	157,980	35,679	193,659
Natural mortality, 40 percent	63,192	14,272	77,464
Yearling males, Aug. 10, 1933	94,788	21,407	116,195
2-year-olds, male and female, estimated:			
Yearling females, Aug. 10, 1932	87,771	19,822	107,593
Natural mortality, 15 percent	13,166	2,973	16,139
2-year-old females, Aug. 10, 1933	74,605	16,849	91,454
Yearling males, Aug. 10, 1932	87,770	19,822	107,592
Natural mortality, 17.5 percent	15,360	3,469	18,829
2-year-old males beginning 1933	72,410	16,353	88,763
2-year-old males killed in 1933	912	189	1,101
2-year-old-males, Aug. 10, 1933	71,498	16,164	87,662
3-year-old males, estimated:			
2-year-old males, Aug. 10, 1932	66,118	14,983	81,101
Natural mortality, 12.5 percent	8,265	1,873	10,138
3-year-old males beginning 1933	57,853	13,110	70,963
3-year-old males killed in 1933	43,158	9,589	52,747
3-year-old males, Aug. 10, 1933	14,695	3,521	18,216
4-year-old males, estimated:			
3-year-old males, Aug. 10, 1932	15,268	2,581	17,849
Natural mortality, 10 percent	1,527	258	1,785
4-year-old males beginning 1933	13,741	2,323	16,064
4-year-old males killed in 1933	342	281	623
4-year-old males, Aug. 10. 1933	13,399	2,042	15,441
5-year-old males, estimated:			
4-year-old males, Aug. 10, 1932	9,573	1,778	11,351
Natural mortality, 10 percent	957	178	1,135
5-year-old males, Aug. 10, 1933	8,616	1,600	10,216
6-year-old males, estimated:			
5-year-old males, Aug. 10, 1932	9,820	1,849	11,669
Natural mortality, 20 percent	1,964	370	2,334
6-year-old males, Aug. 10, 1933	7,856	1,479	9,335
Surplus bulls, 7 years old and over, estimated:			
6-year-old males, Aug. 10, 1932	6,339	1,815	8,154
Natural mortality, 20 percent	1,268	363	1,631
7-year-old males, Aug. 10, 1933	5,071	1,452	6,523
Surplus bulls, Aug. 10, 1932	[1]	[1]	2,893
Natural mortality, 30 percent			868
Remaining surplus for 1933			2,025

[1] Estimates have been worked out, insofar as possible, to show approximate number of seals of each class which should be credited to each island. Seals do not, however, haul out in accordance with figures given. Seals born on either island frequent the other island. They travel promiscuously between and haul out on either of the two islands. The total for both islands, however, is approximately correct.

Complete computation of fur seals, Pribilof Islands, as of Aug. 10, 1933.—Con.

Class	St. Paul Island	St. George Island	Total
Surplus bulls, 7 years old and over, estimated—Continued.			
Breeding bulls of 1932	10,208	2,229	12,437
Natural mortality, 30 percent	3,062	669	3,731
1932 bulls remaining, 1933	7,146	1,560	8,706
Breeding bulls of 1933	10,267	2,287	12,554
1932 bulls remaining, deducted	7,146	1,560	8,706
Increment of new bulls in 1933	3,121	727	3,848
7-year-old males computed for 1933	5,071	1,452	6,523
Surplus bulls computed for 1933			2,025
Total theoretical bull stock for 1933			8,548
New increment of breeding bulls deducted			3,848
Surplus bulls, Aug. 10, 1933			4,700

RECAPITULATION

Class	Total	Class	Total
Pups	418,299	5-year-old males	10,216
Cows	418,299	6-year-old males	9,335
Harem bulls	10,213	Surplus bulls	4,700
Idle bulls	2,341		
Yearling females	116,197	Total, 1933	1,318,568
Yearling males	116,195		
2-year-old females	91,454	Total, 1932	1,219,961
2-year-old males	87,662	Numerical increase, 1933	98,607
3-year-old males	18,216	Percent increase, 1933	8.08
4-year-old males	15,441		

PROGRESS IN BIOLOGICAL INQUIRIES, 1933 [1]

By ELMER HIGGINS, *Chief, Division of Scientific Inquiry*

(With the collaboration of Investigators)

CONTENTS

[1] Appendix III to the Report of the U.S. Commissioner of Fisheries for 1934. Approved for publication, June 7, 1934.

INTRODUCTION

The work of the Division of Scientific Inquiry involves studies from a biological point of view of the various fisheries, in order to determine which are showing depletion and what methods may be applied toward their conservation as well as studies for the development of improved methods of cultivating aquatic animals. Research projects during the past year cover three major fields: (1) Marine and fresh-water commercial fishery investigations; (2) aquicultural investigations; and (3) shellfishery investigations. These projects are organized under seven distinct sections, each directed by a responsible and experienced fishery biologist, and are so distributed as to cover each of the major geographical sections of the United States. They include individual researches on more than 30 different species of commercially important food and game fish, shellfish, and crustaceans.

The various projects engaging the attention of the staff of 43 permanent employees were as follows:

Commercial fishery investigations:
- North and Middle Atlantic fishery investigations: Cod, haddock, mackerel, weakfish, scup, bluefish, and flounder.
- South Atlantic and Gulf fishery investigations: Shrimp and shore fishes.
- Great Lakes fishery investigations: Whitefish, cisco, herrings and chubs, pike perches, yellow perch.
- Pacific coast and Alaska fishery investigations: Red salmon, pink salmon, and herring.

Shellfishery investigations:
- Oyster cultural investigations in New England, South Atlantic, Gulf States, and Puget Sound.

Aquicultural investigations:
- Improvements in hatchery technique for feeding and breeding trout.
- Pond-fish cultural investigations for warm-water fishes.
- Treatment and cure of diseases of hatchery fish.
- California trout investigations.
- Studies in fish nutrition.
- Investigations in interior waters with respect to pollution and the propagation of pearl mussels.
- Stream surveys in the national parks and forests.

The scientific investigation of the fisheries, or of the fish on which the fisheries are based, provides data essential for the proper conservation of the resource. We must have information relative to such fundamental facts as the rate of growth, age at maturity, time and manner of spawning, habits of the young, feeding habits of both young and old, extent and direction of migrations, extent to which the various groups of fish mingle, particularly with respect to their interbreeding, and the enemies or other elements in their environment which tend to reduce the abundance of these fish and other forms in which we are mainly interested and from which we obtain our fishery products.

As a logical extension of these "life history studies" investigation relating to the growth and replacement of fish populations and their fluctuations in abundance are finding increasing application with respect to conservation and management of the great commercial fisheries, by yielding early evidence of depletion, should it occur, as a safeguard to expanding industry; and by predictions of future yields as a direct aid in the orderly conduct of the fishing business. The yield of the commercial fishery, and hence the success of a commercial enterprise, is dependent upon the three major variables: Birth rate, death rate, and migration. A "census" of the fish population upon which a fishery depends, revealing the rate of replacement of the stock, the occurrence of unusually successful spawning seasons, the withdrawals from the stock by normal death rate or by commercial fishing, together with additions or subtractions by the migration of the fish themselves, forms the basis for successful predictions of supplies available in future years. Hence, investigations of the commercial fishery are designed to produce evidence of this sort, which has great practical application in the protection as well as the wise use of our fishery resource.

As an aid to the work of artificial propagation of fish for restocking interior waters, studies are also conducted dealing with the pathology and nutrition of fishes and with improvements in hatchery technique and stocking practices. Moreover, aid to the water farmer in the cultivation of shellfish is rendered by the development of improved practices based upon a sound understanding of the natural requirements of the organisms cultivated.

In addition to these regular functions of the Division, various projects were authorized at the end of the year to be carried out as emergency work with funds from the Public Works Administration. These may be characterized as follows:

1. Stream surveys and stream improvement in the national parks and forests. Sixteen parties will spend periods ranging from 3 to 8 months in the field during 1934 in conducting physical and biological surveys of selected areas in the national parks and forests of the United States, distributed as follows: 4 in the Atlantic coast section, 9 in the Intermountain States, and 3 on the Pacific coast. The object of these surveys is primarily to determine a rational and effective policy of stocking these public waters with food and game fishes and, secondarily, to render such aid and advice as is possible in the areas under study to the United States Forest Service, for the purpose of so changing or improving natural conditions as to increase the carrying capacity of these streams and to facilitate natural reproduction of fishes.

2. A study of stream pollution in the Middle West, also financed by the Public Works Administration. A corps of biologists, biochemists, and engineers will be engaged for 1 year in studying the effects upon aquatic life, either direct or indirect, of industrial and trade wastes, domestic sewage, and river silt. Paralleling this investigation will be a further study by a part of the same staff of means of utilizing, in the increased production of fish food and food and game fishes, the nitrogenous wastes now destroyed but of considerable potential value and of isolating and neutralizing at their sources toxic or harmful wastes resulting from industrial processes now lead-

ing to serious pollution of our streams. This is a new attack by newly perfected methods upon the pollution problem from an entirely different angle than heretofore undertaken and if successful may make possible the adoption on a large scale of simplified methods of sewage treatment.

3. Construction of fish screens in the Pacific Northwest by Public Works funds to prevent the destruction of downstream migrating salmon and other food fishes by irrigation works on Government properties such as reclamation projects or Indian reservations.

4. Investigation of the requirements for fish-protective works at the various hydroelectric, irrigation, and navigation dams on the Columbia River. This project has been financed by the Public Works Administration for a study of fishways and other protective works at the Bonneville (Oreg.) Dam and should be extended to the Rock Island and Grand Coulee Dams.

Much of this work will not actually be undertaken until the spring and summer of 1934. Hence, reports of these activities will be presented in the next annual report of this Division.

STATE COOPERATION

The biological investigations of the Bureau, forming as they do the very foundation of the conservation efforts of the States, have always received liberal support and in many cases active cooperation from the State fish and game departments. The Bureau's investigations, conducted on the highest scientific plane, are always regarded as disinterested and authoritative, and, hence, exert a very real influence on the trend of thought in conservation circles and on local legislation.

Because of the tremendous field to be covered and the relative inadequacy of financial support, the projects for scientific investigation are necessarily chosen because of their wide and general applicability in the protection and development of the fishery resources, and hence local problems frequently remain unsolved for many years. For example, attention is first given to those great commercial fisheries of importance over wide areas for the purpose of determining their trend and present condition either as a guide to their regulation or as a guide to industry in the better utilization of the annual harvests and in avoiding disastrous gluts or famines in the market.

In determining the changes in relative abundance from year to year of the total supply of species supporting a great fishery, problems of local management arise, which, under the circumstances, must be neglected by the Federal Government and must remain unsolved unless the State Governments are able and willing to cooperate in determining the conditions that affect their local fishery. On the Atlantic coast of the United States, for example, the abundance of fish in any of the bays or channels of Long Island or New Jersey, or even in Chesapeake Bay, are largely determined by the variations in abundance in the main stock of fish in the offshore waters. The Bureau's investigations have shown that the weakfish, the scup, the flounder, and the bluefish all migrate extensively over the area from the Carolinas to Cape Cod, and that the spawning areas for most of these species lie chiefly in southern waters. Hence, the regulation of fishing in a Long Island bay would have little effect upon the total fish supply, and whether or not net fishing is regulated or prohibited is entirely a matter of local policy of an economic rather than a biological nature. It remains for the State cooperating biologists to determine by appropriate studies the degree of interchange between local and more generally distributed populations of fish, and the effects of fishing different types of gear upon the local supply.

For many years most gratifying cooperation has been received by the Bureau's biologists from the States. California is now engaged in a cooperative investigation of the trout supplies in California, looking toward a more adequate restocking of the streams and a more rational regulation of fishing. New York State is cooperating in the conduct of a study of the nutritional requirements of trout to improve hatchery practices in feeding and rearing. Oregon has arranged to cooperate with a Bureau investigator in a study of fish diseases in hatcheries. Mississippi has during the past year assisted materially in a survey of their fishing waters. Michigan and Wisconsin have cooperated in the study of the great commercial fisheries in Lakes Michigan and Huron, and an extensive cooperative project has recently been completed in Lake Erie in which Ohio and New York were the chief collaborators with the Bureau. North Carolina, Connecticut, Washington, and Louisiana are assisting in investigations looking to the restoration of the oyster beds of their coastal waters, and similar cooperation has been afforded by Florida and Texas in the past. Georgia, Louisiana, and Texas have joined hands with the Bureau in an extensive study of the great shrimp fishery of the South Atlantic and Gulf coasts. Such cooperation should be materially extended for most fish are migratory; few are limited to strictly State waters; many are international.

While cooperation has been most extensive in a study of the marine fishes, a fertile field for further cooperation remains in the inland waters. Especially are the pollution problems interstate in character for the effects of industrial wastes from mining and manufacturing frequently extend down stream through several State jurisdictions. This is a field in which the Bureau has heretofore taken but a minor part, but owing to recent legislation the Bureau is authorized to undertake such studies, and a material extension of this type of work, which can be made most effective with wholehearted State cooperation, is anticipated.

PUBLICATIONS

Owing to the curtailed funds for printing the number of publications resulting from investigations of the staff or conducted under the supervision of the Division has been reduced. The list of papers published by the Bureau during 1933 follows:

Higgins, Elmer.
Progress in biological inquiries, 1932. Appendix 2, Report, Commissioner of Fisheries, 1933, pp. 79–147.

Sette, O. E.
Outlook for mackerel fishery in 1933. Fishery Circular No. 14, 23 pp., 7 figs.

RICH, WILLIS H., and EDWARD M. BALL.
Statistical review of Alaska salmon fisheries. Pt. 4—Southeastern Alaska. Bulletin, vol. 47, pp. 437–673, 55 figs. Bulletin No. 13.
WEYMOUTH, F. W., MILTON J. LINDNER, and W. W. ANDERSON.
Preliminary reports on the life history of the common shrimp, *Penaeus setiferus* (Linn.). Bulletin, vol. 48, pp. 1–26, 11 figs. Bulletin No. 14.

The following papers were published by members of the staff of the Division of Scientific Inquiry or cooperating investigators during the year 1933 outside of the Bureau of Fisheries' series:

BIGELOW, H. B.
Studies of the waters on the continental shelf, Cape Cod to Chesapeake Bay. I. The cycle of temperature. Papers in physical oceanography and meteorology. Massachusetts Institute of Technology and Woods Hole Oceanographic Institution, vol. 2, no. 4, 135 pp., 66 figs., December.
CHAMBERLAIN, T. K.
Ages and shell measurement of two large specimens of *Megalonaias gigantea* (Barnes). The Nautilus, vol. 67, p. 29, July.
DAVIDSON, FREDERICK A.
Temporary high carbon dioxide content in an Alaska stream at sunset. Ecology, vol. 19, no. 2, pp. 238–240.
Homing instinct and age at maturity of the pink salmon. Pacific Fisherman, vol. 31, no. 8, p. 13, July.
U.S. Bureau of Fisheries conducts inquiry life history of pink salmon. The Wrangell Sentinel, July 14.
DAVIS, H. S.
Recent advances in our knowledge of epidemic diseases among fish in the countries bordering on the Pacific. Proceedings, Fifth Pacific Science Congress.
DEASON, HILARY J.
Geological formation of Great Lakes. The Fisherman, vol. 2, no. 3, pp. 3–4, 10, February.
Feeding adaptations in fishes. The Fisherman, vol. 2, no. 7, pp. 3–4, 10–11, July.
DUDEN, WILLIAM R.
Recent advances in the fishing industry. The Fisherman, pt. I, vol. 2, no. 10, pp. 3–4, 10–11, October.
Recent advances in the fishing industry. The Fisherman, pt. II, vol. 2, no. 12, pp. 3–4, 10, November.
ELLIS, M. M., and D. B. CALVIN.
Glycogen storage by fresh water mussels. American Journal of Physiology, vol. 101, p. 32
FISH, FREDERICK F.
The chemical disinfection of trout ponds. Transactions, American Fisheries Society, vol. 63.
FIRTH, FRANK E.
Concerning three-eyed fishes. The Scientific Monthly, vol. 26, pp. 472–473.
An occurrence of a tunicate killing a fish. Bulletin, Boston Society of Natural History, no. 69, pp. 3–5.
GALTSOFF, P. S.
Pearl and Hermes Reef, Hawaii, hydrographical and biological observations. Bernice P. Bishop Museum Bulletin 107, 5 pl., 3 charts, 49 pp. Honolulu.
GALTSOFF, P. S., and L. E. CABLE.
The current rotor. Science, vol. 77, no. 1992, p. 242.
GINSBURG, ISAAC.
Descriptions of new and imperfectly known species and genera of gobioid and pleuronectid fishes in the U.S. National Museum. Proceedings, U.S. National Museum, vol. 82, art. 20, 23 pp., 3 figs.
A revision of the genus Gobiosoma (Family *Gobiidae*) with an account of the genus *Garmannia*. Bulletin, Bingham Oceanographic Collection, vol. 4, art. 5, 59 pp., 8 figs.
Descriptions of five new species of seahorses. Journal, Washington Academy of Science, vol. 23, pp. 560–563.

HAZZARD, ALBERT S.
Fish planting investigations. Utah Agricultural Experiment Station. Miscellaneous Publication No. 10.
Fisheries research in the Uinta Mountain region. Outdoor America, February–March.
Some phases of the life history of the eastern brook trout, *Salvelinus fontinalis* Mitchell. Transactions, American Fisheries Society, vol. 62, pp. 344–350, 11 figs.
The dry fly. The Rocky Mountain Sportsman, August.
Trout flies and trout foods. The Rocky Mountain Sportsman, September.
Game fish of the Rockies. The Rocky Mountain Sportsman, November.

HERRINGTON, WM. C.
Savings gear and the fisheries code. Fishing, vol. 13, no. 7, pp. 15–16.

HERRINGTON, WM. C., and J. R. WEBSTER.
Why there are good and bad haddock years. Fishing Gazette, vol. 50, no. 10, pp. 4–6, 23.

HIGGINS, ELMER.
Lobster conservation demands protection for the big egg producers. Fishing, vol. 12, no. 1, pp. 18–20, 40–41.

HILDEBRAND, SAMUEL F.
Hybridizing diamond-back terrapins. Journal of Heredity, vol. 24, no. 6, June.

HOLMES, HARLAN B.
Importance of biological study to the Alaska red salmon fishery. Pacific Fisherman, vol. 31, no. 1, pp. 23–24, January.

JUDAY, CHANCEY, and E. A. BIRGE.
The transparency, the color, and the specific conductance of the lake waters of northeastern Wisconsin. Transactions, Wisconsin Academy of Sciences, Arts, and Letters, vol. 28, pp. 205–259.

JUDAY, CHANCEY, and E. SCHNEBERGER.
Growth studies of game fish in Wisconsin waters. Second Report, April.

KOEHRING, V., and H. F. PRYTHERCH.
Shellfish opened by new method. Western Fisheries, vol. 6, no. 3, pp. 5–8, July.

LINDNER, MILTON J.
Progress in shrimp investigations during the year 1932. Louisiana Conservation Review, vol. 3, no. 2, pp. 50–53, 4 figs., April.

LOCKE, S. B., and ALBERT S. HAZZARD.
Utah—resources and activities. Chapter 9, animal life-fish. Department of Public Instruction, pp. 115–147.

LOOSANOFF, V. L.
Observations on propagation of oysters in James and Corrotoman Rivers and Seaside of Virginia. 4 pl., 46 pp. The Virginia Commission of Fisheries, Newport News, Va.

LORD, RUSSELL F.
What about those hatchery trout? Field and Stream, December.
Types of food taken throughout the year by brook trout. Transactions, American Fisheries Society, vol. 63.

MCCAY, C. M.
A continuous extractor of large capacity. Journal, Industrial and Engineering Chemistry, vol. 5, p. 213.

MEEHEAN, O. LLOYD.
The role of fertilizers in pond production. Transactions, American Fisheries Society, vol. 63.

MOTLEY, H. L.
Histology of the fresh water mussel heart, with reference to its physiological reactions. Journal of Morphology, no. 2, vol. 54, p. 415.

NEEDHAM, P. R.
The California trout investigations. California Fish and Game magazine, vol. 19, no. 2, April.
Notes on the use of water fleas as fish food. Transactions, American Fisheries Society, vol. 63.

NESBIT, R. A.
Do northern weaks come from the South? Fishing, vol. 13, no. 4, p. 8.

NEVILLE, WM. C.
Temperature and the southern trawler. Fishing, vol. 12, no. 12, pp. 4–5.
Will the winter fishery off Virginia ruin the industry? Fishing Gazette, vol. 50, no. 6, pp. 10–11, 16.
PARR, A. E.
A geographic-ecological analysis of the seasonal changes in temperature conditions in shallow water along the Atlantic coast of the United States. Bulletin, Bingham Oceanographic Collection, vol. 4, art. 3, 90 pp., 28 figs., January.
PEARSON, JOHN C.
Movements of striped bass in Chesapeake Bay. Maryland Fisheries, pp. 15–17, May.
Unique fishery for the striped bass or rockfish in Massachusetts. Maryland Fisheries, pp. 16–18, September.
PRYTHERCH, HERBERT F.
The oyster industry has progressed from steadily pursued research and experiment. Fishing Gazette, Annual Review Number, vol. 50, no. 7, pp. 42–45, June.
ROUNSEFELL, GEORGE A., and EDWIN H. DAHLGREN.
Tagging experiments on the Pacific herring (*Clupea pallasii*). Journal du Conseil, vol. 8, no. 3, pp. 371–384, December.
SURBER, E. W.
A quantitative study of rainbow trout production in one mile of stream. Transactions, American Fisheries Society, vol. 63.
Observations on circular pool management. Transactions, American Fisheries Society, vol. 63.
TAFT, ALAN C.
Methods for counting small fish in hatcheries. California Fish and Game magazine, vol. 19, no. 2, pp. 122–126.
California steelhead trout problems. California Fish and Game magazine, vol. 19, no. 3, pp. 192–199.
WEYMOUTH, F. W., MILTON J. LINDNER, and W. W. ANDERSON.
A summary of the life history of the common shrimp, *Penaeus setiferus*, of the South Atlantic and Gulf coasts of the United States. Transactions, American Fisheries Society, vol. 62, pp. 108–110.
WIEBE, A. H.
The effect of high concentrations of dissolved oxygen on several species of pond fish. Ohio Journal of Science, vol. 33, no. 2.
The ability of fresh-water fish to extract oxygen at different hydrogen-ion concentrations. Physiological Zoology.
The oxygen consumption of the black bass (*Huro floridana* LeSueur). Transactions, American Fisheries Society, vol. 63 .
VAN OOSTEN, JOHN.
Preliminary report on investigation of chub net meshes in Lake Michigan. The Fisherman, vol. 2, no. 4, pp. 3–4, 8, March.

The following progress reports covering the more important investigations of the Division during the calendar year 1933 were prepared in the main by investigators in charge of the various projects.

NORTH AND MIDDLE ATLANTIC FISHERY INVESTIGATIONS

In common with other activities of the Division, the work in this region has been curtailed severely by reduction in available funds, which has necessitated the withdrawal from service of the fisheries research steamer *Albatross II*, and loss from the staff of a junior biologist and two biological aides. This has interrupted to a serious degree much of the field work which furnishes the basis for an appraisal of the conditions of the fisheries and has necessitated discontinuation of the work on cod, flounders, and butterfish, though results of taggings of the first two named continue to be received. Lack of personnel to assist in the analysis of data has also retarded achievement of results. That our insight into the needs of the fisheries should become clouded at this time is particularly unfortunate for the organization of the fishing industries now in process could be much more effective in providing orderly conduct of the business if information as to the probable future abundance of commercial species were available. Furthermore, the present situation offers unprecedented opportunities for securing sane utilization of the fishery resources and for assuring their continued productivity, if the biological basis for planned utilization could keep pace with the industrial developments.

As now constituted, work in this region has been limited to the investigations on the haddock, mackerel, and certain of the shore fishes of the Middle Atlantic States, notably the squeteague or sea trout and the scup. Thanks to tagging in former years, some additional results may be reported on the cod and on the winter flounder, *Pseudopleuronectes americanus*.

As in former years, the staff, under the direction of O. E. Sette, has been provided with laboratory and library facilities by the Harvard Biological Laboratories and the Museum of Comparative Zoology at Harvard University, Cambridge, Mass., where its members have also benefited from consultation with members of the university, especially Henry B. Bigelow, professor of oceanography and director of the Woods Hole Oceanographic Institution, whose wealth of knowledge and experience relating to marine fisheries research has been ever at the disposal of the Bureau employees. It is a pleasure also to acknowledge the continued cooperation of fishermen and fishing companies in providing data essential to the progress of the work.

HADDOCK

During 1933 the investigation of the haddock fishery has been concentrated on the important year-to-year changes in abundance. The work has continued under the direction of W. C. Herrington while the catch record analysis has been handled by J. R. Webster and the collection of data on the Boston Fish Pier by F. L. Widerstrom during the first part of the year and by F. E. Firth during the latter part. Progress both in the field and in the laboratory was handicapped by injuries to two assistants—A. A. Dallas was injured in January while at sea on the otter trawler *Cormorant* and was incapacitated during the remainder of the year, while G. Sinnett, a temporary employee, broke his leg during a tagging trip in June on the line trawler *Mary E. O'Hara*. During the last half of 1933 the work was considerably curtailed by loss of personnel and reduced budget. The present program is confined mainly to a study of changes in abundance and their causes, through analysis of catch records and length-frequency data obtained principally at the Boston Fish Pier where most of the haddock catch is landed.

Results already have provided a good understanding of the causes of the fluctuations and indicate what measures give most promise for counteracting the declining trend of abundance that is becoming evident. This decline, to be discussed below, apparently is the result of the greatly increased fishing strain imposed by the growth of the haddock fleet during the period of 1925–29. Increases and decreases in the average abundance arise from causes which now appear quite clear cut and comprehensible. An increase follows one or a series of good spawning seasons while a series of poor spawning years results in a rapid drop in the catch. Changes in abundance from bank to bank and within the year principally are the results of mass movements of the fish and appear to follow a fairly regular seasonal cycle. There also is a regular decrease in the catch from summer to winter and an increase from winter to summer which may be the result of seasonal changes in the schooling habits of the fish.

Georges Bank fishery (including South Channel and Nantucket Shoals).—Our data show that the rapid increase in haddock landings, from about 85,000,000 pounds in 1923 to more than 250,000,000 pounds in 1929, was due in part to an increase in the otter trawl fleet and in part to a great increase in abundance of fish on Georges Bank which during these years accounted for about 80 percent of the haddock landed in the United States. This high level of abundance was the result of a series of exceptionally successful spawning seasons during the years 1920–24.

The increase in abundance came to an abrupt halt in 1928 as the result of a series of very poor spawning years, 1925–28, which added relatively few young fish to the population. The commercial stock on Georges Bank, lacking appreciable additions of upgrowing young fish from these poor years, in 1928 began to decrease rapidly under the heavy inroads of fishery. However, the total haddock landings continued to rise until 1929 owing to the addition of new boats to the fleet and to the increased proportion of time spent at sea by all trawlers. The rapid decline begun in 1928 continued until 1930 and 1931 when the level of abundance was the lowest in the history of the fishery. In spite of a gradual shift to the use of the new V–D gear the large otter trawlers were averaging but 5,000 to 6,000 pounds of haddock a day compared to the 18,000 to 20,000 pounds averaged in 1926 and 1927 with the less effective type of trawls then in use.

This rapid downward trend in abundance on Georges Bank was finally halted by the young haddock from the successful spawning year of 1929 which reached commercial size in the winter and spring of 1932. As a result of this influx of young haddock the scrod catch in 1932 averaged nearly three times as great as in the previous year while the average catch per trawler day of all haddock was approximately 40 percent more than in 1931.

By the time the 1933 season was well under way the trend in the catch once more turned downward. The 1929 class had attained its maximum effect in 1932 and had begun to decline in the face of a still intensive fishery, and as the 1930 spawning had been a relative failure there were few additions of upgrowing young fish to replace those caught off by the hundreds of line trawlers and otter trawlers hard at work on the banks. Consequently, the average catch per trawler day for 1933 was nearly 20 percent lower than in 1932.

The fishery on Georges Bank appears to be due for a continued decline for the next 2 years unless, as is remotely possible, there develops a considerable immigration of haddock from the eastern banks

(Browns, Sable Island, etc.). The 1931 class, which came into the fishery in the late fall of 1933, to some extent will augment the catch in 1934 but its effect cannot be determined at present owing to our inability to collect sufficient data at sea during the past year. However, a very rough approximation of the relative abundance of this year class, obtained from the limited data collected on trawler trips in 1932 and from commercial catch data for November and December 1933 is that the 1931 class is somewhat less than half as abundant as was the 1929 class at the same age. If this be the case, this group may be sufficiently large to maintain the commercial haddock population on Georges Bank at about the same level as in 1933, providing that the majority of the large otter trawlers continue to do most of their fishing on the eastern banks rather than on Georges. It appears more probable, however, that the catch per trawler day in 1934 will be less than in 1933.

The catch in 1935 depends on the degree of success of the 1932 spawning season. Fish of this year class would have averaged somewhat less than 35 centimeters in length during 1933 and if abundant would have been taken in large numbers by the commercial trawlers. No reports of such catches have been received during the past year; consequently, it appears that the 1932 class was a relative failure. Haddock of this year group can provide the only additions to the fishery in 1935; if it was a failure as the above evidence indicates, the level of abundance in 1935 must again show a marked decline.

Eastern banks fishery.—Under eastern banks we have grouped all the haddock grounds east of the Fundian Channel (the deep gully separating Georges from Browns Bank). From present data this gully appears to form a complete barrier to the movements of the young haddock during the entire year and to the older fish during most of the year. For example, the 1929 year class showed no movements across the channel until their fourth winter (that of 1932–33) and the older fish have shown mass movements across this channel only around the spawning season. The details of these movements have not yet been worked out.

The chief distinguishing characteristic of the haddock populations of the regions east and west of the Fundian Channel is the difference in the rate of growth of the younger fish. For example, on Georges Bank the 1929 class reached commercial size during the winter of 1931–32 and spring of 1932, while on the eastern banks the same year class did not reach commercial size until the spring and summer of 1933, a difference of about a year and a half. The same difference is being indicated by the 1931 year class. A difference in growth rate probably continues in the older fish but is less evident because of increasing intermixture of the stocks.

As a result of growth differences the 1929 class did not have its full effect on the eastern banks fishery until the summer of 1933. Only a few boats were fishing the area at that time but shortly afterward most of the large otter trawlers shifted their activities from Georges to the eastern banks in the vicinity of Sable Island, where extremely good catches of scrod haddock were being taken. These large scrod catches brought the average catch per trawler day for 1933 up to a level approximately 40 percent higher than for 1932.

Because of the recent influx of the 1929 year class into the commercial catch the prospects for the eastern banks fishery in the next 2 years are better than for the fishery on Georges. In the spring and summer of 1934 the upgrowth of young haddock of the 1929 class should cause a very considerable increase in the average catch per day of scrod haddock. The late fall fishery should show an increase over 1933 in the catch of large haddock but a decrease in scrod. The level of abundance for the entire year should be considerably higher than in 1933, depending on how well this stock of fish can survive the present intensive fishery. By 1935 these banks should begin to show a decline similar to that on Georges in 1933.

Summary for all banks.—The difference in growth rate on Georges Bank and the eastern areas acts as a very efficient means of spreading over a period of 2 to 3 years the maximum effect of an abundant year class instead of concentrating it in one fishing season. Except for this phenomenon the effects of good and poor year classes would be much more drastic than has been the case. Under these conditions, with a fleet that can operate either on Georges or on the eastern banks, the fishery as a whole can maintain a fairly even level if a good spawning season, such as that in 1929, occurs every 3 years. If good spawning seasons occur at intervals of less than 3 years, the level of the fishery should rise, while if the intervals are more than 3 years, the level should fall.

A summary may now be given of the past and expected future course of the fishery as affected by the spawning seasons 1929–32 of which the 1929 season was very successful, the 1930 season a failure, the 1931 season poor, and the 1932 season appears to have been a failure. Resulting from the haddock spawned in these years there was a distinct improvement in the fishery in 1932 (1929 class on Georges) and maintenance of the catch in 1933 (1929 class on eastern banks). In 1934 the fishery as a whole may be expected to maintain a level near that of 1933, possibly somewhat better (1929 class on eastern banks and 1931 class on Georges) while in 1935 there should be a distinct decline in the catch per trawler day (3 spawning years either failure or poor, 1930–32). Developments in 1936 will depend on whether the 1933 spawning season was a success, fair, or a failure.

A long-range view of the haddock fishery (1916–35) suggests that in the last 10 years there has been a decided decline in the level of abundance of the haddock population. The catch per trawler day during the past 4 years (1930–33) has been but about 52 percent as much as the average for 1916–30 in spite of improvements in the nets and other gear. Taken by 5-year periods the averages per trawler day were 1916–20, 14,600; 1921–25, 13,400; 1926–30, 14,800; 1931–33, 8,100. Even assuming a 25 percent improvement in the catch for 1934 and a level in 1935 equal to 1933, the average for 1931–35 will be little more than half as much as for the previous 15 years.

Present haddock program.—To maintain our present qualitative analysis of the condition of the fishery and its expected future trend, we must continue the catch record and length-frequency analysis which has been under way since 1931. In addition, more data on small haddock will have to be obtained at sea from trawler trips. However, if estimates of future abundance are to be more precise and if measures for counteracting the declining trend of the fishery are to be developed, it is essential that certain additional work be undertaken. This includes a systematic collection at sea of data on the size and abundance of young haddock below commercial size and the study of growth and migrations through analysis of scale data and through tagging experiments.

Among these requirements the one farthest from realization is the collection of adequate data on the size and abundance of the young haddock below commercial size. Although some data of this type can be obtained by investigators making regular trips on commercial trawlers, satisfactory data cannot be collected without the use of an able research vessel equipped for trawling.

The study of growth and migrations through analysis of scales and by tagging experiments has suffered through lack of time rather than lack of material. Some age and growth determinations have been made from the scales to verify the interpretation of our length-frequency data, but we have not been able to give this subject the attention it deserves. Experiments with captive haddock have developed a tag which gave good results from releases along the Maine coast, but so far neither this nor other types of tags tried on haddock caught by commercial fishermen on the offshore banks has given even encouraging results. Since it appears probable that these failures may be caused by the rough treatment necessarily suffered by haddock when taken in commercial gear, it may be necessary to await the time that a research vessel is available to permit the careful handling necessary for tagging operations.

Savings gear.—It is apparent that in recent years there has been a decided downward trend in the haddock population level and that under the present fishery this trend can be expected to continue unless remedial measures are adopted. The single most unequivocally practical and beneficial measure now apparent is the prevention of the capture of haddock below market size. These haddock, if left in the ocean, later with increasing size would help to maintain the commercial catch at a higher level than would be possible otherwise. The means by which a large part of this saving may be accomplished has been demonstrated by the Bureau's work on "savings gear" in 1931 and 1932. At present several of the boat operators are trying out the recommended modifications in the construction of otter trawls. The scarcity of undersized haddock during the past year and distractions of the economic situation have prevented the problem from receiving the attention it deserves. Recommendations have been made to the N.R.A. code authorities for including the restriction of mesh size in the fishery code.

Early life history.—The 1932 observations on early life history were limited to one June cruise covering the area from Nantucket Shoals to Cape Sable, Nova Scotia. The trip was made possible by the kindness of the Woods Hole Oceanographic Institution in detailing for our use the *Atlantis* with her equipment and crew. Although the cruise was made later in the season than those of the 2 previous years, it provided valuable information on the distribution of the late larval stages of the haddock and added another valuable hydrographic survey to our series of records. Probably of most interest are the returns from drift-bottle releases during 3 successive years, 1931–33, in the Georges Bank-South Channel region.

The returns from 1931 and 1933 are similar in that most of the returned cards were from the shores of New England and the Bay of Fundy. In contrast, almost half of the returns from 1932 releases were from across the Atlantic. Hence it appears that in 1931 and 1933 the surface currents were resultantly westward and northward. In 1932, on the other hand, the drift was strongly to the southward off the banks and thence to the eastward.

These differences are significant because of their bearing upon the destinations of fish eggs spawned in the affected areas. Their continued study may throw much light on the causes for the success or failure of the spawning seasons.

We have been able to continue during the past year the arrangements, with L. A. Walford of the Harvard Graduate School, for the analysis of the collections of eggs and larvae. The results continue to indicate that there is little or no transfer of haddock eggs or larvae from Georges to Browns Bank or the reverse.

MACKEREL

A statistical review of the American mackerel fishery, which was completed during the past year, is eloquent of the sharp fluctuations in yield that have characterized this important fishery throughout its history. The investigations here reported upon have been designed to ascertain the causes of these remarkable fluctuations and to devise such means as may be practicable to counteract their ill effects.

It has been found that the changes in abundance responsible for the fluctuations in yield are caused mainly by the unequal numbers of young mackerel added to the stock annually as a result of reproduction. For instance, the additions of young were remarkably large in 1923, 1930, and 1931; they were only moderate in 1921, 1928, and 1929; and were few or none, in all other years. As a result of the remarkable production of young in 1923, the first of the "good years" observed, the catch rose to a peak in 1926. However, with the failure of the ensuing years the catch again declined until the 1928 class of young caused a recovery in 1929. Following this increase there followed another decline which persisted until the highly successful reproductions of 1930 and 1931 increased the commercial stock to a level which in 1932 and 1933 was comparable with that of 1926.

Almost as remarkable as the inequalities in reproductive success from year to year are the differences between year classes in their relative rates of decline and geographical distribution during the years following their first appearance in the fishery. Two general types are distinguishable: a "persistent type" that affords a moderate yield in its second year, a maximum yield in the following year, and thereafter declines moderately, the decline being so gradual that contributions to the commercial catch remain important for a decade or more; and a "transitory type" that furnishes its maximum yield in its second year and thereafter declines so sharply that its effect is felt in the commercial fishery for only 2 or 3 years. The persistent type is further distinguished by its continued presence throughout almost the entire fishing season in waters south of Nova Scotia but never extending to Nova Scotian waters. The transitory type, on the other hand, appears in the United States fishery mainly in the spring and late fall and also usually extends along the coast of Nova Scotia and even into the Gulf of St. Lawrence.

Obviously, knowledge of the relative abundance of various year classes together with their respective rate of decline acording to type affords a basis for predicting future abundance of mackerel. This in turn should permit the industry to plan its activities in advance, thus ameliorating the otherwise disorganizing effects of unexpected gluts and famines of supply.

The knowledge essential for predictions is based on a measure of relative abundance secured from an analysis of the catch per mackerel vessel coupled with a study of the ages of the mackerel present in the stock as judged from samples of the catches landed by commercial fishermen. In 1933, as during former years, this work was under the direction of O. E. Sette, assisted by F. E. Firth, who made the necessary observations on the mackerel catch at Cape May, N.J., during April; at New York during May; at Boston from June to October; and at Gloucester during November and December. Of the 2,651 fares landed during 1933, aggregating 29,528,100 pounds, 1,612 were recorded by localities of capture through interviews with captains and 881 were sampled to provide information on the ages of mackerel, in the course of which 26,094 individuals were measured and 1,733 scale samples were collected and subsequently examined to determine the age of the fish from which they were taken.

The 1933 season interposed unusual difficulties to biological study because, by voluntary agreement among the vessel owners and operators, the activities of the fleet during most of the season were restricted greatly both as to the periods of time each vessel was permitted to operate and as to the maximum fare which each vessel could land. These important modifications in the operations of the fleet required the employment of special methods to determine the abundance in 1933 relative to that of former years. However, by applying appropriate corrections it appears that the abundance of mackerel in 1933 was at least 22 percent greater than in 1932, and that if the fleet had operated without restrictions the catch would have been at least 55,000,000 pounds as compared with the actual catch under the restrictions in force of 29,528,100 pounds. The first-named quantity is within 2,000,000 pounds or 4 percent of the "high estimate" given in our prediction for the season and within 11,000,000 pounds or 25 percent of the "most probable estimate."

Biologically, conditions in 1933 were of particular interest, for the events of this year were critical in determining whether or not the class of 1931 was of the persistent type. Prior to the opening of the season it already had been concluded that the 1930 class was of the persistent type, but there was considerable doubt as to the type of the 1931 class. In predicting, the "most probable estimate" was based on the assumption that it was of the transitory type merely because the latter had occurred somewhat more often than the former. Recognition that the 1931 class might be of the persistent type formed the basis for the "high estimate." Inasmuch as the latter would have been realized if fishing had been unrestricted, there is afforded convincing evidence that the 1931 class is of the persistent type.

With two important year classes present in the stock of mackerel, both of them of the persistent type, which may be expected to suffer only a gradual, moderate decline during the next decade, and since these now dominate the catch, it appears that relatively high, though gradually declining, abundance is assured during a number of years even though no important new year classes appear in the immediate future. Of course, the advent of such year classes would raise the level of abundance still higher, perhaps halting the decline and possibly causing heights of abundance exceeding any that have been observed since the present studies were initiated.

The results of predictions during the past 6 years have demonstrated not only the practicability of the method but also have indicated two primary weaknesses which must be eliminated if the system is to attain the accuracy that is essential in the event that commercial operations are to be adjusted to the prospective yield. These are: First, lack of means to estimate the prospective abundance of yearlings; and, second, inability to determine the type of year class prior to its second year in the commercial fishery. We believe that both of these difficulties may be overcome by appropriate investigation of the biological factors involved. To solve the first-named question, the services of a suitably equipped research vessel are necessary to survey the relative abundance of mackerel that are too young to form a part of the commercial catch. The second probably would yield to suitably designed, large-scale tagging experiments coupled with morphometric analyses of the differences between year classes. The personnel and equipment at present available are inadequate to undertake these phases of the work.

A further question demanding early attention involves the merits of the present practice of catching large quantities of yearling mackerel. These mackerel are so small that disproportionately large numbers of individuals must be caught to make up a moderate poundage, and at the same time their worth in the market per pound is usually only a fraction of that of fish only 1 year older. A solution involves a study of the losses through mortality and decreased availability compared with the gains due to increased weight per individual and increased price per pound. Here again much light might result from tagging experiments.

With tagging looming as an important future technique, experiments were undertaken during 1933 to determine suitable methods of marking this delicate species. The results demonstrate the feasibility of securing quantitative results from tagging methods but at the same time they indicate extraordinary difficulties which can be overcome only by special procedure that involves either the services of a research vessel or a chartered mackerel-fishing vessel.

COD

The continued interest of W. C. Schroeder, formerly of the Bureau of Fisheries but now with the Woods Hole Oceanographic Institution, in the migration of cod has made it possible to analyze the returns from tagged cod released in 1932 and former years, though limitation of funds prevented the initiation of any new experiments. The releases of 1931 and 1932 are of most interest, for they were designed to provide information as to whether or not the small cod that predominate on the grounds along the coast of Maine gradually spread to offshore grounds as they grow older and in this way serve to replenish the commercially important stock of large fish offshore. Former markings did not throw light on this question because a large percentage of tags were lost from the fish within the first year, but since 1931 more permanent marks were used and statistically significant returns of cod that were liberated two years ago are being received. Thus far local returns have predominated, which indicates that there is no important spread of the cod from the coast of Maine before their fourth or fifth year. However, of 2,680 tagged in 1931 and 1932, 5 or 0.2 percent were returned from Georges Bank; whereas of the 12,000 comparable releases formerly made with the less permanent tag, only 0.004 percent were reported from offshore grounds. There was a similar improvement of distant recaptures along shore, which indicates that the new-style tags are more suited to the problem than the ones formerly used. It remains for future returns to indicate a more marked offshore movement, if such there be, later in the life of the cod.

WINTER FLOUNDER

Of 4,179 tagged winter flounders (*Pseudopleuronectes americanus*) released at Waquoit Bay and Woods Hole during the spawning season (January to April) of 1931, 141 were returned in 1931, 64 in 1932, and 33 during 1933. Last year's returns were consistent with those of former years; the majority were retaken during the spawning season at the place of liberation, and the remainder were reported from the adjacent sounds and the contiguous open sea during other months of the year. Half of the fish were marked with a tag placed at the nape, and half with the tag placed at the dorsal edge midway between head and tail. The marked superiority of nape tags in the third year returns indicates the greater permanence of marks placed in this position.

SHORE FISHES OF THE MIDDLE ATLANTIC STATES

These investigations were continued under the direction of R. A. Nesbit. Because of reduced appropriations it was necessary to curtail collections of data in 1933. Daily sampling of the commercial catch at important fishing centers was abandoned completely. Field operations consisted of observation of the winter trawl fishery landings at Portsmouth, Va., during January, February, and March; hatching experiments with squeteague eggs at Wildwood, N.J., in June, and tagging experiments with squeteague in Sandy Hook Bay, N.J., and of Hog Island, Va., in October, and with scup at Woods Hole, Mass., in November. In addition, Prof. A. E. Parr, in cooperation with the Bureau, continued his studies of the biology of the young of food fishes in New Jersey.

Squeteague.—In the report for 1932 it was suggested that the most important increments to the New York and New Jersey stocks of squeteague during the period 1928–32 consisted of fish which had spent their first two growing seasons south of Delaware Bay. This implies that replenishment of the northern stocks of sequeteague depends a great deal less on local reproduction than on immigration from more productive southern spawning areas. Further findings during 1933 necessitate substantial modification of this view.

Although these findings strongly support the view that the great majority of the squeteague taken in the northern fishery enter that fishery for the first time as 2-year-old fish after having spent a year as yearlings south of Delaware Bay, it now appears that approximately half of these immigrant 2-year-olds originate in the North and return there after a year spent in the South. This compels a revision of the opinion that northern spawning ordinarily makes no significant contribution to northern stocks of adults. It still appears, however, that these stocks are dependent on southern spawning areas for about half of their increment.

The evidence for this modified view of the rather complex behavior of squeteague consists in part of the results of 1932 tagging experiments, in part of further analysis of scale collections, and in part of the results of a hatching experiment with squeteague eggs. These will be discussed in turn.

During the following summer 47 belly tags were returned from 1,900 juvenile squeteague tagged in October 1932, near Montauk, N.Y. Of these, 14 were taken south of Delaware Bay, 24 in or north of Delaware Bay, and 9 were not accompanied by records of date and locality of recapture. It is certain that many more tagged fish were recaptured than were reported, especially between May and September, for internal tags are not discovered unless the fish are gutted. Since the fish were small (average length 8 inches) when tagged, many were undoubtedly culled from the catch and discarded without examination. Because of the slower growth of southern yearlings, it is probable that a larger proportion of the southern than of the northern summer recaptures were not reported. Thus it is apparent that the southern yearlings which provide the bulk of the northern increment of 2-year-old fish in the following year include an unknown but possibly considerable number of squeteague which originated in the North.

More useful is the evidence from further analysis of the scale structure of fish in representative samples of the commercial catch, for it permits a quantitative estimate of the respective contributions of northern and southern spawning and nursery areas to the northern stock of adults.

The method used previously, that of comparing the early growth increments (as calculated from the scales) of northern adults with the corresponding observed increments of northern and southern juveniles and yearlings, although satisfactory for distinguishing those northern adults which have been in the South as yearlings from those which had been in the North, has not proved adequate to determine where these fish were as juveniles (i.e., fish less than a year old).

In 1933 a method was employed which appears to permit separation of the northern adults according to origin. This consists of comparing the average spacing of circuli in the first growth zone of the scales of northern adults with the spacing in the corresponding zone of northern and southern juveniles and yearlings. It was found that the northern juveniles and yearlings agree in having a significantly wider average spacing than the southern juveniles and that the frequency distribution of the spacing values of northern adults indicates a mixture in almost equal proportions of fish that have first growth zones characteristic of northern and southern juveniles. The scales of yearling fish show similar differences between the second summer zone circuli when northern and southern yearlings are compared. The great majority of northern adults, however, show second zone spacing of the southern type even though the first zone of about one-half of them is of the northern type.

In order to determine whether squeteague eggs are capable of hatching at the temperatures prevailing in the North during the spawning season, an experiment was carried out jointly by Prof. A. E. Parr and R. A. Nesbit. Squeteague eggs were found to hatch freely at all temperatures from 13° to 25° C. Since this exceeds the range of temperature observed in the northern as well as southern localities where eggs occur, it is certain that low temperatures do not, as suggested previously, prevent successful reproduction in the North. No explanation has yet been found for the uniform absence of squeteague larvae from the northern plankton collections.

Thus far the evidence for the view that the great majority of northern adults, including many that originated in the North, spend their second summer south of Delaware Bay consists of the observation that in the North yearlings are never sufficiently numerous to account for the numbers of older fish in subsequent years; of the observation that the calculated second summer growth increments of northern adults agree much better with the observed growth of southern than of northern yearlings; and of the fact that the spacing between circuli of the second growth zone of the scales of northern adults agrees with that of the corresponding zone of the scales of southern yearlings, and differs sharply from that of the scales of northern yearlings.

Direct evidence from tagging experiments is still lacking. The results of the October 1932 tagging in Pamlico Sound, N.C., indicate that in 1933 very few of these fish migrated to waters north of Virginia. In this experiment 1,900 squeteague were tagged, of which about 1,600 were yearlings or older. In the summer of 1933, 115 tags from yearlings or older fish were returned, 68 from North Carolina, 8 from Virginia and Maryland, including Chesapeake Bay, and 1 from New Jersey. Thirty-eight tags were returned without data as to the location of recapture. Since most of the latter were returned from southern markets, it is probable that the majority were recaptured in North Carolina or Virginia. The interpretation of this lack of northern returns is impossible because of the necessity for abandoning observations of the age composition of the northern catch. Previous observations have proven that increments to northern stock are irregular from year to year. In 1933 very few southern squeteague may have migrated North, in which case none of the tagged fish from the South could have been expected to show up in the North. As it is, negative evidence is not conclusive and positive evidence must be sought. In a further attempt to secure direct evidence of migration of southern yearlings 900 squeteague, about half of which were yearlings, were tagged off Hog Island, Va., in October 1933.

In order to determine the winter habitat of northern adult squeteague, 220 were tagged in Sandy Hook Bay, N.J., in October. The New York Aquarium kindly lent its collecting vessel, the *Sea Horse*, for this experiment.

Results obtained thus far indicate that if conservation measures are found necessary for maintenance of the general stocks, their application is, in the main, an interstate rather than a local problem. Any locality which imposes restrictions on the catch of marketable fish with the object of improving the future yield at the sacrifice of immediate gain must necessarily bear the whole burden of the immediate restriction but share to some extent any future gain with other localities. For example, if fishing be restricted in eastern New York during the spawning season, any resulting increase in the productivity of the spawning season must be shared with the fisheries of Virginia, Maryland, Delaware, and New Jersey. Indeed, during the season immediately following the whole benefit would accrue to these States, for of the recaptures of juvenile squeteague tagged at Montauk in 1932 not a single individual returned to eastern Long Island in 1933. That this is not exceptional behavior in that year is indicated by the persistent absence of yearlings in New York between 1928 and 1932.

There remain, however, certain local problems which merit further investigation. Foremost among these is that of eliminating the waste of yearlings in a number of southern localities during the early summer. This problem as it applies to Pamlico and Core Sounds in North Carolina was investigated by Higgins and Pearson in 1925,[2] and specific recommendations were made. The results of the 1932 tagging described above indicate that the major part of the gain would accrue locally, even in the following year. Steps should be taken, moreover, to investigate the practicability of modifying pound nets to permit the escape of squeteague below commercial size.

Among the more pressing local problems in New York and New Jersey is further investigation of the factors controlling the supply of squeteague in the many enclosed bays of these States. Thus far, the investigation has been concerned primarily with the causes of fluctuations in the general stock of squeteague on the Middle Atlantic region. It has been assumed that the supply of fish within the bays is influenced primarily by fluctuation in the general stock. It is possible, however, that there may be wide and uncontrollable variations from year to year in the proportion of the total stock frequenting the bays. It is also possible that the fishery within these enclosed areas may be so intensive as to remove fish more rapidly than they enter from outside waters, and thus produce an abnormally low level of abundance during the greater part of each season. Even severe depletion of the bays during a par-

[2] Higgins, Elmer, and J. C. Pearson. Examination of the summer fisheries of Pamlico and Core Sounds, N.C., with special reference to the destruction of undersized fish and the protection of the gray trout, *Cynoscion regalis* (Block & Schneider). Bureau of Fisheries, Document 1019, 1927.

ticular season need not be regarded as prejudicial to the future supply either in the bays or in the general stock from which the bay supply is drawn, for the number of fish in the bays appears to represent but a small proportion of the general stock. There is no reason for believing that complete removal of all the fish in the bays by the fishery would influence the future supply to any greater extent than the removal from the general stock of an equivalent number of fish from outside locations. If the commercial fishery alone were concerned, rapid depletion of the inside supply each year would be a matter of little concern, for the total number caught would in any case be limited to the number entering the bays and it would not matter whether they were caught early in the season or later.

However, these bays not only support a commercial fishery but provide a recreational resource of great value. It cannot be determined without further investigation whether unrestricted fishing within these bays is incompatible with maintenance of satisfactory angling conditions. It may be pointed out, however, that angling in the bays at the eastern end of Long Island, N.Y., where commercial fishing is not restricted, does not appear to be less satisfactory than in the New Jersey bays where numerous restrictions are in effect.

Scup.—Investigation of this species by W. C. Neville has shown that the pound-net yield is subject to wide fluctuations caused by variation from year to year in success of reproduction. Complete recovery of the pound-net yield in the period 1929–33 from the low levels of 1926–28 demonstrates that under the conditions prevailing until 1929 the fishery was not taking undue toll of the stock. Since 1929 an additional toll of about 25 percent has been taken from the stock by the winter trawl fishery off the Virginia Capes.

As in 1932, attention was focussed on determination of the effects of the increased strain. Thus far there appears to be no evidence of ill effects. Four of five recent spawning seasons, 1927, 1928, 1930, and 1931, are known to have been successful and there is evidence that the 1932 season was productive as well. As a result the yield of the summer fishery remains high. Hence, it is apparent that the combined effects of the summer and winter fisheries have not reduced the numbers of spawning adults sufficiently to prevent successful spawning.

It is not to be expected, however, that all future spawning seasons will be productive. Experience suggests that sooner or later conditions similar to those of 1926–28 will again obtain. Under such conditions the increased strain of the combined fisheries may assume a serious aspect. There remain many facts to be ascertained, if the Bureau is to be prepared to make sound recommendations for the protection of the fishery when the need arises. Particularly is this true of the winter fishery where remarkable and as yet not fully understood changes in the locality and composition of the catch have occurred.

It is desirable, therefore, that the present observations of the winter fishery be continued and that observation of the summer fishery be resumed.

IMPROVEMENT OF INVESTIGATIONAL SERVICE

This report would not be complete without mention of the things most urgently required to facilitate the acquisition of biological facts necessary for the conservation of the fishery resources of this region.

The principal impediment to progress at present is the lack of assistants to analyze the statistics of the fishery and the biological records necessary for their interpretation. Practically every determination of changes in abundance, average differences in growth rate, and the like involve the handling of mass data, such as the daily catch of a large number of boats over an extensive area throughout a considerable period of time or the summation of large numbers of measurements of fish or of fish scales. The purely clerical work involved in the reduction of such mass data to comprehensible terms attains a magnitude not usually appreciated. Furthermore, more frequently than not, during the course of study the need for additional data from the fishery becomes necessary and progress is halted until the investigator himself can spend the weeks or months necessary to collect them. Here again the provision of assistance would facilitate the work greatly. Due to lack of assisting personnel, both in the laboratory and in the field, the results reported above are fewer in number and much less definite in purport than would have been the case if adequate assistance were available. Under the circumstances it is readily apparent that a very small increase in the salary roll necessary to provide the appropriate assistance would double the value of results by increasing their number and their significance.

Secondly, the lack of a suitably equipped research vessel capable of offshore work has been a very serious handicap. While data collected ashore on the fish brought in by fishing vessels and at sea on commercial fishing craft must always provide the basic material for determining the condition of the resource, the interpretation of these facts requires also the kind of data that can only be secured at sea by a vessel equipped to handle hydrographic instruments, special nets and trawls, and free to survey the particular grounds that must be examined to elucidate the phenomena occurring in the fishermen's catches.

Thirdly, the restoration of activities at the United States Fisheries Biological Station at Woods Hole is needed to complement the regular investigative program. Just as data at sea are necessary to elucidate the peculiarities of yield exhibited by fishermen's catches, laboratory experiments are often required to discover certain basic features of the life processes of fishes and their responses to certain environmental conditions. At the Woods Hole station many of these studies could be pursued by volunteer investigators from universities at no expense to the Government beyond those incidental to care and maintenance of the equipment of the establishment.

FISHERY INVESTIGATIONS OF THE SOUTH ATLANTIC AND GULF COASTS

INVESTIGATION OF THE SPAWNING HABITS, LARVAL DEVELOPMENT, AND RATE OF GROWTH OF FISHES

The study of collections of young fish and field data collected principally on the coast of North Carolina was continued during the first several months of the year by Dr. Samuel F. Hildebrand assisted by Louella E. Cable. A comprehensive manuscript, illustrated with drawings prepared by Miss Cable, on the spawning habits, the larval development, and rate of growth of several species of the family consisting of the croakers, drums, king whiting, and weakfish or sea trouts (Sciaenidae) was completed and submitted for publication. This paper includes keys for the identification of young Sciaenidae of the South Atlantic and Gulf coasts of all the species for which the young are known.

The study of the general collection of young fishes from the South Atlantic was continued. Complete or almost complete series, showing the different stages of development, for several species were found. Drawings were prepared for some of these series.

A young tarpon only about 20 millimeters, in transition from the leptocephalus to the adult stage, was found in the collection. The young of this fish heretofore were unknown entirely. A description, with notes, of this young tarpon was prepared and submitted for publication.

A SURVEY OF THE FRESH WATERS OF MISSISSIPPI

A general survey of the fresh waters of the State of Mississippi was begun by Dr. Hildebrand in cooperation with the State Game and Fish Commission. The investigation was conducted for the purpose of determining the status of the fisheries and to study the life histories and spawning habits of the fishes of the State, with the view of gaining information that would be useful in preparing proper regulatory measures and in building up and conserving the fisheries.

The fisheries in general were found to be in a fair to good condition. As Mississippi is still largely rural, the drain on the fisheries has not been as pronounced as in some other States where there is a greater concentration of population. Neither have the waters been as seriously polluted in Mississippi as in many other States. However, in some sections of the State the fisheries have suffered severely because of deforestation and drainage. This has caused fluctuations in the stages of the streams decidedly detrimental to the fish fauna.

A lively interest in fish and fishing was manifested in all sections of the State visited, and an earnest desire prevails on the part of many citizens to build up and conserve this resource.

A report on the investigation embodying notes on the life history and habits of the fishes, recommendations for the improvement of certain waters, and suggestions for improved regulatory measures was prepared. The study of the fishes and data collected is being continued with the view of preparing a catalog and general account of the fishes of the State.

MARINE FISHES OF THE GULF COAST

Continuing his studies of the marine fish fauna of the Gulf coast, Isaac Ginsburg has been engaged during the year in examining collections of fishes from many localities and in revising the taxonomy and classification of a number of families among which confusion exists in the literature as a necessary preliminary to the preparation of a monograph on the fishes of the whole region.

The systematic study of the flounders occurring in American waters was carried forward and continued during 1933, especially those species which are related to the important commercial genus of *Paralichthys*, since for a complete understanding of the status of the species of this genus, it is important to fix definitely the morphological limits of related species. Further studies on the species of *Paralichthys* were also carried out. As a result of these studies a preliminary report on some of the species was published in the Proceedings of the United States National Museum.

Studies were also made on the systematics of two families of the smaller fishes, namely, gobies and seahorses. These fishes are common and form a regular feature of the littoral marine fauna. On account of their common or frequent occurrence they of necessity must play an important role in the complex interrelationship of the littoral marine fauna.

SHRIMP INVESTIGATIONS

During 1933 the shrimp investigations have continued as in the past under the direction of Dr. F. W. Weymouth of Stanford University and Milton J. Lindnér. Curtailment of funds resulted in the dismissal of Gordon Gunter and a clerical assistant in June, but John C. Pearson, assistant aquatic biologist, was transferred to the staff at this time.

Through the excellent cooperation of the Louisiana Department of Conservation, the Texas Game, Fish, and Oyster Commission, and the Georgia Tidewater Commission the major portions of the shrimp investigation program have been continued in spite of a reduced budget. Headquarters have been maintained at New Orleans, La., in offices furnished by the Louisiana Department of Conservation, with field stations at the United States Fisheries Laboratory, Beaufort, N.C., the Georgia Tidewater Commission, Brunswick, Ga., and the San Patricio Canning Co., Aransas Pass, Tex.

Although three species of shrimp occur in the fishery through most of its range, which extends from North Carolina to the Mexican border, the investigations at present are being directed mainly toward solving problems concerning the life history of the common shrimp (*Penaeus setiferus*). This species is by far the most important because it comprises over 95 percent of the commercial catch. The other two species, the grooved shrimp (*P. brasiliensis* and the sea bob (*Xiphopenaeus kroyeri*), each furnish about 2½ percent of the catch.

At Beaufort, N.C., Dr. J. S. Gutsell has continued his collections of young and adult shrimp. In addition, he is studying the histological development of ovarian eggs of the three species of shrimp in an attempt to delimit more closely the spawning times and places.

During 1933 the South Atlantic work carried on by W. W. Anderson at Brunswick, Ga., was extended to cover the entire coast from Charleston, S.C., to Cape Canaveral, Fla. This program was initiated in May after an exploratory trip to the Cape Canaveral grounds in January had indicated the possibility of extensive movements of the shrimp along the South Atlantic coast during late fall and winter. Nine stations were established along this 300-mile stretch of coast, as follows: Stono Inlet, S.C.; Gaskins Bank, S.C.; St. Catherines Island and Brunswick, Ga.; Fernandina, Mayport, St. Augustine, New Smyrna, and Cape Canaveral, Fla. The stations are distributed from 1 to 6 miles off the places mentioned. Each locality was visited once every month and 2 or 3 hauls of 1 hour each were made. In addition, the inside waters consisting of the creeks, rivers, and sounds, in the vicinity of Brunswick, were trawled for shrimp each month.

Analysis of the data gathered at these stations indicates that there are no important nursery grounds for the common shrimp south of St. Augustine, Fla., while the reticulated coastal sections of Georgia and northern Florida appear to be the major nursery area of the South Atlantic. This observation tends to corroborate other evidences which imply that the postlarval shrimp that spawn in the ocean or Gulf of Mexico and pass their larval stages there must reach the inside waters at an early stage in order to survive. Additional work is needed to substantiate this point definitely.

Length frequency distributions of the common shrimp along the Georgia coast during the fall and winter of 1931–32 and 1932–33 show a definite disappearance of the large shrimp (above 140 millimeters) from the fishery areas. During both years this disappearance began with the onset of cold weather in October and reached its maximum in January and February. Coincident with the disappearance of the large shrimp from the Georgia grounds there arose a fishery in the vicinity of Cape Canaveral, Fla. This Florida fishery usually reached its maximum in January and rapidly declined thereafter until by the latter part of March only a remnant remained. The January (1933) trip to these southern grounds disclosed the fact that the shrimp population at Cape Canaveral was composed almost exclusively of large shrimp, for over 97 percent were above 140 millimeters and 62 percent were between 156 and 170 millimeters.

This evidence would indicate a southward movement of the large shrimp throughout the fall and winter with a concentration near Cape Canaveral. However, during the fall and winter of 1933, although the scarcity of large shrimp was as evident along the Georgia coast as in the previous two years, the Cape Canaveral fishery failed to materialize to the extent it had during the previous two winters. This leads to four possible hypotheses: (1) The movement of shrimp is not from north to south, but from inshore to offshore waters; (2) the large shrimp at Georgia points were depleted during the summer and early fall fishery, consequently only a few remained to move south; (3) instead of wintering near Cape Canaveral as in recent seasons the shrimp moved further south along the Florida coast and out of the customary fishing grounds; (4) the shrimp migrated south to Cape Canaveral, but because of colder waters along the coast moved offshore to warmer waters nearer the Gulf Stream.

Because of the lack of data over a sufficient number of months, it is impossible to state at this time which of these hypotheses represents the true situation. It is extremely important that the present studies, with some modifications, be continued in order to arrive at a correct solution of the problems involved as they are of vital importance economically and biologically.

In addition to the above, the South Atlantic operations have yielded sufficient information to allow the projection, for the first time, of what appears to be a normal growth curve. The constant influx of young shrimp into the fishery and the continual movements of the shrimp from place to place have made this impossible in the past. Application of this curve to data gathered along the South Atlantic and Gulf coasts indicates that there may be a longer spawning season than at first suggested and also that there may be two peaks of spawning, one in winter and the other in late spring and summer.

In Texas, Kenneth H. Mosher has continued the sampling of the commercial catch of shrimp at Aransas Pass. In addition, the Texas program has been extended along the coast to cover the major shrimping ports monthly. In each locality a random sample of shrimp is taken from a number of fishing boats. The shrimp are sexed, measured, and the degree of maturity noted.

An analysis of the Texas lighthouse temperature records including Sabine Pass Light, Galveston Jetties Light, Half Moon Reef Light, Aransas Pass Light, and Brazos Santiago Light, indicates an inshore cold water barrier near Point Isabel, Tex., that averages 20° F. colder during the summer and 10° F. colder during the winter than any of the more northern Texas points. Because of the lack of sufficient offshore water temperatures adjacent to Point Isabel, it is difficult at this time to state how representative the water temperatures at Brazos Santiago Light are of the conditions in the Gulf near Point Isabel. The occurrence of a cold water barrier in this locality would have considerable influence on the coastwise movement of shrimp, fishes, and other marine life in southern Texas and northern Mexico.

In Louisiana, owing to decreased funds, the collecting trips of the Bureau's research vessel *Black Mallard*, which is maintained by the Louisiana Department of Conservation, were reduced to 1 a month but of slightly longer duration, instead of the customary 2. John C. Pearson has examined the entire plankton collections secured since the inauguration of the study in Louisiana and has found that young postlarval *Penaeus brasiliensis* occur in the surface offshore tows throughout the winter, spring, and summer, which indicates an extended spawning season for this species. Although *P. setiferus* is much more abundant than *P. brasilensis*, no postlarval young of this species have been secured in the surface tows. From this evidence it is believed that the young stages of *P. setiferus* are demersal. The recent addition of new hoisting equipment allows for the operation of subsurface and bottom fine mesh nets. Consequently, it is expected that during the coming spawning season the young stages of *P. setiferus* will be found in considerable abundance in the offshore waters.

Body proportional measurements of *Penaeus setiferus* in Louisiana indicate the possibility of two groups or races of common shrimp. This work is still in a formulative stage and must be continued over a longer period of time and in more localities before definite conclusions can be drawn.

In Louisiana and Texas a disappearance of large *Penaeus setiferus*, similar to that in Georgia, takes place during the winter. In these two States there is no winter fishery for large shrimp, such as occurs in Florida, to indicate where the winter habitat may be. At the onset of colder weather in the fall the shallow coastal waters of Louisiana cool rapidly to a distance of about 10 miles offshore. Further offshore, beyond this variable zone, bottom temperatures are higher. As greater depths are reached, however, bottom temperatures of the Gulf again decline. Consequently, there is a zone of warm bottom water off the Louisiana coast throughout the winter bounded on one side by colder inshore waters and on the other by the cold waters of the depths of the Gulf. The recent addition of a winch to the *Black Mallard* has allowed collecting cruises in this warm water zone as weather permitted. Both large *P. setiferus* and *P. brasiliensis* were found in this area during the winter of 1933. Collecting trips are made throughout this warm water zone off Louisiana whenever possible in an effort to determine whether or not shrimp concentrate in dense schools in certain offshore localities as it is customary for them to do inshore. With the present type of vessel it is exceedingly difficult to make any intensive survey of offshore waters because rough seas are prevalent throughout most of the winter.

The grooved shrimp, *Penaeus brasiliensis*, evidently spawns most prolifically in the Gulf throughout the winter for during December, January, February, March, and April an abundance of postlarval young are taken in the surface plankton tows. From March until June the young grooved shrimp which were spawned in the Gulf are found in large quantities in the inside waters along the entire Louisiana coast. As they develop, the grooved shrimp disappear from the inside and adjacent offshore waters and few remain by July or August. These shrimp, with few exceptions, cannot be found until the following winter when a newly hatched group of young appears. During the winter of 1933 large, mature grooved shrimp were obtained in nearly every haul in the offshore warm water zone. This fact indicates that the inside waters serve not only as nursery grounds for the common shrimp but for the grooved shrimp as well. The grooved shrimp, however, move offshore at an earlier stage than the common shrimp. With the present geographic limitations of the fishery, the young grooved shrimp leave the fishing areas before they have reached sufficient size to be of much commercial value.

Except for the detailed accounts of one cannery, it has been impossible to secure adequate catch records to determine the relative abundance of the shrimp. The data which have been obtained do not indicate serious depletion of the supply, but this fact does not indicate that depletion will never occur. On the contrary, because of the short life of the common shrimp, which is believed to be only 1 year, it is possible that depletion can become a serious problem. Consequently, it is recommended that all States utilizing shrimp commercially provide for records of the catch suitable for purposes of abundance analysis. Louisiana is the only State which has taken steps toward this goal. The Louisiana Department of Conservation recently inaugurated a system whereby any person receiving shrimp directly from a fisherman must complete a form furnished in triplicate by the State. The completed form gives the following information: The date, the name of the person receiving the shrimp, the name of the fisherman or captain, the name and registration number of the boat, the approximate locality of the catch, the type of gear (seine, trawl, or cast net) used, the length of the net used, the amount of shrimp received, and the price paid for them. The original is given to the fisherman, the first carbon retained by the purchaser, and the second carbon held by the purchaser until collected by an agent of the conservation department. In this way the required information is obtained daily on each catch of shrimp by every fisherman.

If this system is continued in the proper manner, it should be possible within a few years to determine closely any annual fluctuations in the abundance of shrimp in Louisiana. A definite knowledge of the abundance of shrimp is not only of benefit to the State, in that when depletion occurs it may be detected in its early stages and proper remedial actions taken, but also such knowledge is of great benefit to the industry because it will tend to prevent the enactment of restrictive measures when they are not required.

It is strongly urged that the other States of the South Atlantic and Gulf area follow the course of Louisiana and adopt adequate statistical systems for the ultimate benefit of the State and of the industry.

PACIFIC COAST AND ALASKA FISHERY INVESTIGATIONS

The major salmon and herring investigations carried on by the staff of the Fisheries Biological Station at Seattle, Wash., were continued during 1933. Although the field activities of these investigations are confined to definite localities in Alaska and on the Pacific coast, they all have as their common goal the study of the causes responsible for the fluctuations in the abundances of these species with the aim of providing for permanent and productive fisheries throughout the entire region.

The development of two power dam projects on the Columbia River during the past year necessitated a study of the ways and means of protecting the migratory fish at the dams. During the summer and fall a survey was made of the salmon and trout populations in the Columbia River and its tributaries in the vicinity of the dam site for the Grand Coulee Dam in the State of Washington. The results from this survey were used as a basis for recommendations concerning the protection of the migratory fish at this dam. In the latter part of November, Harlan B. Holmes, one of the members of the station's staff, was temporarily assigned to the study of the ways and means for protection of migratory fish at the Columbia River Dam at Bonneville, Oreg.

KARLUK RED-SALMON INVESTIGATION

The biological investigation on the Karluk River red salmon, conducted by J. T. Barnaby, was continued during the past year. The prime purpose of this investigation is the determination of the ratio between the spawning escapement and the return from that escapement; the determination of the fluctuations occurring in these ratios from year to year; and the causes for such fluctuations. A thorough knowledge of the magnitude of these fluctuations and their causes will enable an economically sound regulation of this fishery as well as of other fisheries of a similar nature.

Another marking experiment was initiated, 40,000 seaward migrants being marked by the amputation of the two ventral and the adipose fins. The returns from this experiment will appear in the runs of 1934, 1935, and 1936. The 1933 run was sampled throughout the season for the purpose of recovering fish marked in previous years; 178,080 fish were carefully examined and 931 marked fish recovered. These marking experiments will, when completed, enable the determination of the fluctuations in the ocean mortality of these red salmon, the calculation of the number of seaward migrants during the year each experiment was initiated, and the calculation of the mortality rate during the time these fish spent in Karluk Lake.

Scale samples were taken throughout the season for the purpose of determining the age composition of the run. A weir was again operated in the Karluk River and the age composition of the escapement can also be calculated from the data thus obtained.

Special attention is being given the data collected to date in respect to returns from known escapements to ascertain to what extent heredity influences the time of migrating to the ocean and the time of returning to spawn. There is a considerable degree of variation from year to year in the age composition of the runs and likewise of the escapements. It is felt that this study, together with the limnological investigations being carried on at Karluk Lake, will, at least to some extent, clear up the problem of why escapements of similar magnitudes produce different-sized returns.

Two trips were made to Karluk Lake, one during July and one during October, at which time spawning-ground surveys were made and limnological data collected.

In addition to the red-salmon run, the Karluk River supports a run of pink salmon of considerable importance. With a normal escapement, the pink salmon occupy the spawning grounds in Karluk River proper and none enter Karluk Lake to continue on to the red-salmon spawning beds. Thus, while both species spawn in the same watershed, their spawning grounds are distinct. Occasionally, however, due to a series of conditions unusually favorable to the pink-salmon population, certain brood years produce extremely large runs. At such times population pressure forces some of the pinks to continue on to the red-salmon spawning grounds. In years when the number of pinks on the red-salmon spawning grounds is not large, no harm is done. However, at times when there is a relatively large escapement of pink salmon there is not only overcrowding on the pink-salmon spawning grounds, but serious overcrowding on the red-salmon spawning grounds. This condition may be severe enough to result in almost total loss of all pink-salmon spawn, and a very serious loss of red-salmon spawn through the suffocation of unspawned pinks and reds and damage to the eggs already laid in the gravel beds.

A report submitted to Commissioner Bell pointed out that although the data for use as the basis for the prediction of a future run of pink salmon are meagre, all the evidence at hand points to an extremely large run of that species to the Karluk River in 1934. Recommendations were submitted as to the most advisable remedial action in case a large run does materialize.

CHIGNIK RED-SALMON INVESTIGATION

An investigation of the red-salmon runs of Chignik River, Alaska, was continued by Harlan B. Holmes, assisted by George B. Kelez. As a result of shortage of funds, field work was restricted to what could be done by one man. This consisted essentially of collecting routine data relating to the season's run of mature fish and recovering mature fish that had been marked as fingerlings.

The principal object of this investigation is to determine the number of fish that should be permitted to spawn each year so as to produce the greatest surplus for the commercial fishery in the succeeding generations and at the same time protect the run. The procedure has been to observe the results of propagation of varying numbers of spawners. With a few minor interruptions, the number of spawners has been counted each year from 1922 to 1932. In 1933 high water prevented counting.

As a significant proportion of the fish do not mature until in their sixth year, returns from only the first six broods are now available. Complications in the life and habits of the fish have delayed exact analysis of the results. Tentative interpretations suggest that the relation between number of spawners and number of adults produced is not as regular as we hoped to find it. The ratio of number of spawners to return has varied from approximately 1/1 to 1/7. The largest ratio accompanied the smallest number of spawners, but the smallest ratio did not coincide with the largest spawning escapement. The largest total return was produced by the largest spawning escapement, but in contrast to this the second largest escapement produced the smallest total return. It, therefore, will be impossible to state, even approximately, the most desirable number of spawners until more experience is available. It is hoped that in the meantime we may acquire a greater knowledge of the life of the fish and the conditions that affect their mortality, both of which will permit more exact analysis of the data and application of the findings to other streams.

A peculiar feature of the Chignik red salmon is the fact that fingerlings are found in the river below the lakes from May through September or later. In other streams the fingerlings are found in the lower river only during a short period of seaward migration. It first was presumed that the seaward migration at Chignik extended for the 5 months. As it was realized that such a long migration period would result in scale characters that would be confusing in age determination from the adult scale, 65,000 of the presumed migrants were marked in 1929. The marking was divided into three lots, the fish in each lot being distinctively marked. The first lot represented fish caught between May 29 and July 4; the second lot from July 11 to July 24; the third from August 16 to August 26.

The mature fish from this marking, which returned to spawn during 1932 and 1933, have added interesting anda valuable information to our knowledge of their life and habits. Among the returns from the first lot 67 percent continued on to the ocean during the year in which they were marked, whereas the remaining 33 percent lingered an additional year in fresh water. Of the second lot only 4 percent migrated during the year of marking and 96 percent remained in fresh water for an additional year. In the third lot only 3 percent migrated and 97 percent remained for another year. These observations indicate that the seaward migration is confined essentially to the early part of the season and that for the remainder of the season the fingerlings found in the river—even down to the entrance of the estuary—must return to the lake before winter. Preliminary returns from marking in 1930 and 1931 confirm these findings and indicate that this peculiar habit is a regular occurrence.

BRISTOL BAY RED-SALMON INVESTIGATION

Although funds were not available for a biologist to carry on field work in Bristol Bay during the past year, scales of the 1933 red-salmon populations in this area were secured through the cooperation of the Alaska Division of the Bureau. Scale samples and body measurements of the red salmon composing the runs in Bristol Bay have been accumulating for a number of years. These data were studied by Dr. Frances N. Clark at Stanford University during the past year. Dr. Clark analyzed the data from the Nushagak area of Bristol Bay, and included in a report the results of this analysis together with recommendations for future investigations in this area. This report, " Red salmon in Nushagak district, Bristol Bay ", is now on file in the Washington office.

PUGET SOUND SOCKEYE INVESTIGATION

The study of the fluctuations in abundance of sockeye salmon of Puget Sound in the State of Washington was continued during the past year, under the direction of J. A. Craig. For the purpose of this investigation, a statistical study has been made of the catch return of a constant unit of gear fished during a constant period of time.

Total catch or pack records are often inaccurate and at times even misleading when used for the purpose of judging the relative abundance of a population of fish over a period of years. This must necessarily be so when it is evident that economic conditions, changes in total fishing effort, legislation, or a change in fishing methods might cause fluctuations in the total catch of any species quite apart from any changes that might have occurred in actual abundance.

Records of the daily catches of a selected group of traps in Puget Sound were collected and analyzed on the basis of the average catch per trap per fishing day, thus providing a constant unit of fishing gear and time. When these records were analyzed and compiled in the form of an index of abundance, the index indicated a marked drop in the abundance of the Puget Sound sockeyes from 1917 to 1932, inclusive.

A detailed inspection of the daily fluctuations in abundance of the sockeye salmon during each fishing season indicates that the middle portion of the season, which at one time provided a large part of each season's catch, has suffered the greatest decline. This may be very significant, since from previous studies of red or sockeye salmon it appears that each tributary of a large river system such as the Fraser, which provides practically all of the Puget Sound run, may support a separate race or population of sockeye salmon each of which has a definite time of migration into the stream. Therefore, this decline of the middle portion of the run may indicate that certain races are being more rapidly depleted than others and are in need of protection.

Scale samples were taken during the past fishing season. These will be studied in a attempt to link scale characteristics to the seasonal fluctuations in the run. If this can be accomplished, the degree of racial differentiation during the season can be established, and possibly some of the races identified in the commercial fishery and their spawning grounds determined.

Marked fish from the Birdsview, Wash., marking experiments of 1929, 1930, and 1931 were recovered from the commercial catch during the past season. This experiment was carried on for the purpose of determining the most favorable time for the liberation of hatchery-reared sockeye salmon.

PINK-SALMON INVESTIGATION

The pink-salmon investigation in southeastern Alaska, under the direction of Dr. Frederick A. Davidson, was continued during the past year and included a cooperative project with the National Canners Association of Seattle in addition to the regular program of activities.

One of the natural handicaps encountered in the pink-salmon fishery is the rapid decrease in the quality of the salmon as they become sexually mature. With the onset of sexual maturity the male pink salmon develops an enormous hump on his back and a greatly elongated grotesque head. The hump is composed mostly of cartilage and is grown at the expense of the fatty and muscular tissue of the back. The female pink salmon, on the other hand, changes very little in body form with sexual maturity but owing to the heavy drain imposed upon its stored energy, by the maturation of the eggs, it likewise deteriorates in condition very rapidly. In fact as both males and females become sexually mature their flesh becomes soft and loses practically all of its fat content and red coloration.

When the pink salmon migrate into the inside waters of southeastern Alaska, they practically cease feeding and depend upon their stored energy for maintenance and growth during the remainder of their life cycle. The pink salmon that appear in the first part of the season are sexually immature and draw upon their stored energy only for the purpose of maintenance during their migration to the spawning grounds. As the season progresses, however, the salmon composing the runs begin to show signs of sexual maturity while still in the waters subject to the commercial fishery. Hence these salmon draw upon their stored energy for maturing the sexual products as well as for maintenance during their migration. It is owing to this double drain upon their stored energy that the pink salmon entering the commercial catch during the latter part of the season are of poorer quality.

The percentage fat content and degree red coloration in the flesh of the Pacific salmon have for years been used as a market standard for quality. Hence, any information concerning the seasonal change in these measures of quality in the pink salmon would be of value to the cannerymen in grading their packs. It is for this reason that the National Canners Association of Seattle cooperated with the Bureau in a project aimed to determine the change in the percentage of fat content and degree of red coloration in the pink salmon entering Snake Creek at Olive Cove, Alaska, during the past summer. Ten pink salmon were taken at random from the run each day during the season. These fish were first measured in order to estimate their state of sexual maturity as indicated by their body form. A proportionate cut was then taken from each fish and canned in a half pound can. At the close of the season these canned samples were turned over to the National Canners Association to be analyzed. Each canned sample of fish bore the date it was taken and the sex of the fish so that the chemical analysis will indicate the change in the composition of both sexes throughout the season. The results from the analysis of the change in the body form of the pink salmon show that sexual maturity began to appear in the salmon at the beginning of the third quarter of the season. The results from the chemical analysis of the samples have not as yet been completed.

The study of the racial characteristics of the pink salmon composing the runs in Snake Creek and Anan Creek in southeastern Alaska were continued during the past summer. The data collected for this study during the past summer will complete the data necessary for the study of the racial characteristics of the pink salmon in these streams for two complete life cycles; viz, the 1930–32 cycle and the 1931–33 cycle. The results from this study thus far point very definitely to a racially distinct population in each stream. There is also some indication that the even- and odd-year populations in each stream are likewise distinctly different. The analysis of the data collected this year will make it possible to draw definite conclusions in regard to the individuality of the odd- and even-year populations in each stream.

HERRING INVESTIGATION

In December 1933 the herring investigation, under the direction of Dr. George A. Rounsefell, assisted by Edwin H. Dahlgren, submitted to the Bureau a report on the races of herring in southeastern Alaska. The populations of herring were studied by analyses of vertebral counts, growth rates, the proportions of various year classes and by the recovery of tagged herring.

In analyzing the vertebral counts only counts of herring of the same year class were compared as it was shown in a previous report on the herring of Prince William Sound, and is too apparent in these data to need proof, that the mean vertebral count differs between herring of different year classes from the same locality. Segregation of the material by year classes has not been followed in the European racial work on herring, which fact doubtless accounts for many of the inconsistencies in results.

In order to be certain that grouping the samples by localities would not in itself bring out differences that were really due merely to random sampling two tests were first made to determine if the data as a whole were homogeneous. The first test was to determine whether or not any correlation exists between the mean vertebral count in the various localities of one particular year class and the temperature during the spawning period of each locality. High negative correlations were found for the 1927 and 1926 year classes, respectively. The second test was to analyze the variances of 158 samples of the vertebral count in the manner shown by R. A. Fisher, after first discarding four of the samples whose variances exceeded the normal range of variances. This test showed very conclusively that the samples are not homogenous, and that the differences between the means are too great to be assigned to chance sampling.

Application of the same test to the samples from each of seven major localities gave opposite results. In each case all of the differences between the means of samples could be assigned to random sampling. This also was in accord with the assumption that different localities might possess different populations of herring.

Comparisons of the means of the vertebral count from the various localities revealed three groups of herring that differ significantly from their neighbors: namely, Petersburg, Noyes Island and vicinity, and the localities east of Clarence Strait and south of Sumner Strait including Wrangell.

Comparisons of the length distributions of herring of the same year class show that herring of four localities: the Noyes Island area, the Douglas Island-Içy Strait area, Affleck Canal and Peril Strait are all much slower growing than those from the other localities. The Peril Strait herring appear to be the slowest growing of any yet encountered in Alaska, the median of the 4-year olds taken in June 1930 being only 176 millimeters.

Comparisons of the age distributions of purse-seined material (avoiding the selected distributions derived from gill-netted samples) caught in 1929 and 1930 show (1) the 1926 year class to be overwhelmingly dominant in most of the localities, (2) the 1926 and 1927 year classes to be approximately equal at Noyes Island, (3) the 1927 year class to be very dominant in Peril Strait, (4) the 1926 and 1923 year classes both dominant at Douglas Island and at Favorite Bay, (5) a large percentage of the catch older than the 1923 year class at Douglas Island. These facts support the evidence given by the vertebrae and the growth rates which separate the Noyes Island area, Peril Strait, and the Douglas Island-Icy Strait area from neighboring localities.

During the fishing season of 1933 (June 1 to Sept. 30) 101 belly tags and 7 opercle tags were recovered from 2,499 of the former and 1,470 of the latter affixed to spawning herring released at Jamestown Bay (Sitka) between April 21 and April 25, 1933. All of these tags were recovered around Cape Ommaney, between Larch Bay and Port Alexander, giving the first definite proof of a migration of some length, as it is approximately 66 miles by water from Jamestown Bay to Port Alexander.

On the other hand, out of 996 belly tags and 824 opercle tags affixed to herring released at Cape Bendel, just under 60 miles from Port Alexander, on August 17, 1932, no tags have been recovered. This may be considered rather definite evidence of a lack of migration between Cape Bendel and Cape Ommaney.

In another tagging experiment at Auke Bay near Juneau, 800 belly tags and 772 opercle tags were affixed to spawning herring released on May 3, 4, and 5, 1933. No recoveries have been made supporting the previous conclusion of a lack of migration between Juneau and Cape Ommaney.

The recovery in the Jamestown Bay (Sitka) tagging experiment of 4 percent of the belly tags and only one-half of 1 percent of the opercle tags clearly demonstrates the superiority of the former. The maximum lengths of time elapsing from time of tagging to time of recovery were 149 days for belly tags and 147 days for opercle tags. However, when the fishing season ended on September 30, 1933, the belly tags were being returned at approximately the same rate as at the beginning of the season so that the recovery of more 1933 tags is confidently expected in 1934.

The tagging experiments represent the first successful attempt at tagging a clupeoid fish, and it is likely that this method can be applied to the sardine, the menhaden, and other clupeoids.

INVESTIGATIONS CONCERNING THE PROTECTION OF MIGRATORY FISH AT POWER DAMS ON THE COLUMBIA RIVER

Grand Coulee Dam investigation.—It is proposed to construct a dam approximately 370 feet in height across the Columbia River at the Grand Coulee. This site is some 140 miles upstream from the Rock Island Dam and approximately 150 miles south of the Canadian border.

J. A. Craig and Harlan B. Holmes were detailed to make a study of the possible effect of this dam on the salmon and trout of the Columbia River. The number of salmon and steelhead trout passing over the Rock Island Dam were counted from July 21 to August 27, inclusive. A survey was then made of the spawning streams between Rock Island and the Grand Coulee site so that an estimate of the number of fish spawning between the two locations could be made. All available data were collected on the magnitude of the runs at points above Grand Coulee. From these data it was estimated that the run which would be intercepted by the Grand Coulee Dam may be as small as 5,000 to 15,000 chinook salmon and an undetermined number of steelheads.

Recommendations for the protection of these runs were submitted to the Fish and Game Commissions of Washington and Oregon for their approval. Because of the great height of the dam with its consequent danger to downstream migrants, it was felt that provision should be made to capture upstream migrants, spawn them artificially and liberate the offspring below the dam.

Bonneville Dam fishway investigation.—As a part of its public works program, the Federal Government is constructing on the Columbia River at Bonneville, Oreg., a dam to generate electric power and facilitate navigation. This dam will intercept annual runs of salmon, trout, and other fish valued at several million dollars a year. The passage of these fish over the Bonneville Dam will involve the greatest problem of fishway construction that ever has been attempted. It is unfortunate that past experience with fishways for a great part has not been satisfactory and we cannot point with assurance to devices that can be relied upon to pass this large mass of migratory fish over the dam.

A portion of the funds allotted to the construction of the dam has been assigned to the Bureau of Fisheries for the purpose of devising means of passing the runs of fish. Harlan B. Holmes, who has been placed in charge of the work, is being temporarily assisted by experts in various of the engineering and biological phases of the work. The investigation is being conducted in close cooperation with the commercial fishery interests and Fish and Game Departments of the States of Oregon, Washington, and Idaho.

As the work has been in progress for only about a month, no results are available as yet. The investigation will involve a study of the statistics of the fishery for the purpose of determining the time and magnitude of the runs. All types of fishways that have been used or proposed are being carefully studied. Experiments are being conducted to determine if the fingerling salmon and trout will be injured in passing through the power wheels. In case it is deemed necessary to prevent the fingerlings from passing through the wheels, means of diverting their migration will be studied and suitable bypasses provided. A careful study will be made of conditions during the period of construction so as to assure free passage of the fish at that time.

GREAT LAKES FISHERY INVESTIGATIONS

Owing to the severe curtailment of the budget no field work of any kind was conducted on the Great Lakes during the calendar year 1933, with the exception of one small project carried on by a member of the Great Lakes staff during the period April 3–14 at Sandusky, Ohio. Efforts were therefore devoted entirely to working up in the laboratory the tremendous amount of data that had been accumulated during the field investigations in past years and to prepare them for publication. Fishery investigations on the Great Lakes, under the direction of Dr. John Van Oosten, are conducted from headquarters and laboratories furnished by the University of Michigan at Ann Arbor.

During the year Dr. Stillman Wright completed a voluminous report on "A limnological survey of western Lake Erie with special reference to pollution." This report covers a series of investigations begun by the State of Ohio in 1926 and completed in cooperation with the Bureau in 1930. The report includes sections on physical limnology, chemistry, bacteriology, phytoplankton, zooplankton, bottom organisms, and pollution in its relation to the fisheries. After a detailed consideration of these various technical subjects it was concluded that pollution in the western part of Lake Erie was not the primary or controlling factor in the depletion of the fishery in this lake. Dr. Wright also studied a series of plankton collections taken by the Bureau's investigators from certain lakes in Alaska. Owing to curtailed appropriations Dr. Wright left the Government service on June 3 and was immediately engaged by the Government of Brazil to conduct limnological surveys in the northeastern part of that country.

Progress has also been made in the further analyses and compilation of the data secured during the chub-net investigation of Lake Michigan and the deep trap-net investigation of Lake Huron and Lake Michigan (for details see report for 1932). It is gratifying to report that on the basis of the data secured during the deep trap-net survey, important regulations were passed by the Legislature of the State of Michigan that will safeguard to a large extent the seriously threatened depletion of the valuable whitefish, especially in Lake Huron.

During 1933 the Bureau continued its cordial relations with the various Great Lakes States and provided them with considerable information and scientific data concerning the commercial fisheries. Many memoranda on various fisheries problems were requested by and prepared for officials of several conservation departments; and considerable assistance was also rendered them in preparing outlines for field investigations, in drawing up fishery regulations, and in furnishing expert testimony at public hearings called by legislative committees. In fact, the Bureau's office at Ann Arbor, Mich., served more or less as a clearance house in supplying the States with scientific information on the Great Lakes fisheries.

One important Great Lakes interstate conference should be referred to here. It was called at Chicago by the Director of the Conservation Department of Wisconsin on January 5, 1933, for the purpose of considering uniform regulations of the commercial fisheries of Lake Michigan. The meeting was attended by officials of the four States fronting Lake Michigan and of the Bureau. Excellent conservation measures were agreed upon at the conference, but these later failed of passage in the several States. In addition to this Chicago meeting, Dr. Van Oosten attended some 17 other conferences during 1933 largely in connection with fisheries legislation. He has also represented the Bureau at various meetings called for the purpose of drawing up a Great Lakes fishery code and has provided the basic conservation measures that are being considered for inclusion in this code.

FISHERY STATISTICS

In July 1933 the Bureau began an intensive statistical study of the commercial fisheries of the Great Lakes waters of the State of Michigan under the immediate supervision of Dr. Ralph Hile. Data in the form of monthly reports submitted by each licensed fisherman to the department of conservation furnished the material for the investigation. Each report contained a daily record of the catch by species, the kind and amount of gear lifted, the length of time the gear was fished, and the location of the fishing grounds. The reports for the years 1927 and 1928 were by no means complete, but since the beginning of 1929 there has been available a virtually complete record of all commercial fishing activities in the State.

For the purpose of analysis of the statistical data the Great Lakes waters of the State of Michigan have been divided into statistical districts which, as far as possible, represent natural geographical divisions. There are 7 districts in Lake Superior, 11 in Lake Michigan, 6 in Lake Huron, 1 in Lake St. Clair, and 1 in Lake Erie. The analyses have been directed toward a study of fluctuations in the total catch and total intensity of the fishery and also in the relative abundance of the several important species from year to year and from one locality to another. Abundance is calculated in terms of yield per unit of fishing effort.

The use of identical types of gear in totally unrelated fisheries and important variations both from one region to another and from one time of year to another in the amount of time gear is fished before it is lifted have made necessary the development of special methods of analysis for the study of Great Lakes fisheries statistics. The former difficulty was met by an allocation of effort in the direction in which it was actually exerted, that is, a particular unit of gear is considered to have fished for a given species only when some quantity of that species is included in its catch. The latter of the above mentioned difficulties was obviated through the introduction of the time element in the computation of fishing effort. Thus the fishing effort represented by a day's lift is not merely the amount of gear lifted, but rather is the product of the amount of gear lifted and the time the gear has fished. The sum of these separate products can be considered to represent the true fishing intensity for a given district or a given period of time. A detailed explanation and justification of these methods has appeared in a special publication.

At the present time the statistical studies are being confined chiefly to Lake Huron. In the near future a report will be prepared on the statistics of the commercial fisheries of that lake for the 5-year period, 1929–33.

PIKE-PERCHES

H. J. Deason was detailed to make a brief survey of the commercial lifts of trap nets operated during the period, April 3–14, 1933, in the vicinity of Sandusky, Ohio, and the islands of western Lake Erie. Particular emphasis was placed on the percentage of illegal saugers taken in these nets. Counts were made in the field of all legal and illegal saugers, yellow pike-perch, and yellow perch taken in 104 commercial trap nets operated at Sandusky, Put-in-Bay, and Toledo. Many saugers were also weighed, measured, and sexed at these three localities.

In addition much work has been done on the life history studies of the pike-perches of Lake Erie. A publication on these species was completed and presented at the annual session of the American Fisheries Society. It was observed that dominant age-groups occurred in the collections made in 1927 and 1928. The 1926 year class was dominant in both collections in the case of the yellow and blue pike-perch, and probably also of the sauger. Comparing the growth rate of the three species of pike-perches it was found that the yellow pike-perch ranks first in the rapidity of growth, sauger ranks second, and the blue pike third. The sauger, however, becomes sexually mature at a smaller size than does the blue pike-perch and the latter matures at a smaller size than does the yellow pike-perch.

A study of the relationship of percentage of immaturity to the existing legal size limits now in force in Lake Erie indicates that the present size limits of all three species of pike-perches should be increased to afford better protection to spawning females. In order to help insure spawning by females at least once, a size limit of 15 inches total length is indicated as a minimum for yellow pike-perch. On a similar basis, a minimum of 13½ inches total length is recommended for blue pike-perch and a minimum of 12½ inches total length for saugers.

A report was also completed on the analyses of the stomach contents of the yellow pike-perch, sauger, and grass pike from Lake Champlain.

YELLOW PERCH

Studies of the life history of the yellow perch of the Great Lakes were continued. Scales from 2,434 fish were examined during 1933. Of these 2,434 scale samples, 1,095 were collected from western Lake Erie in 1929, 1930, and 1932; 513 were collected from Green Bay in 1932; 606 were collected from Saginaw Bay in 1929 and 1930; and 220 were collected by the University of Michigan Museum of Zoology during different years. Growth rates have been calculated for all except the Saginaw Bay collections.

Although detailed comparisons have not been made as yet, the growth rate of the fish from Green Bay appears to be very similar to that found in Lake Erie. This conclusion refutes the argument of the Green Bay fishermen of Wisconsin that the perch in their waters are dwarfed in growth and that therefore a small size limit on this species in Wisconsin waters is justified and necessary. The Lake Erie collections of 1929, 1930, and 1932 when compared with the 1927–28 collections seem to show that the yellow perch has increased its growth rate somewhat after 1928. The yellow perch from Saginaw Bay appear to grow at a faster rate than those from Lake Erie or Green Bay.

To check the suspicion that more than one race of yellow perch inhabited Lake Erie, body depth measurements were compiled for 613 yellow perch collected off Lorain, Ohio, and for 114 yellow perch collected off Erie, Pa., both collections having been made in 1929. Slight differences in body depth were found between the sexes of a collection. The fish collected off Erie, Pa., were found to be somewhat slimmer bodied than those taken off Lorain, Ohio, but the difference was found to be so small that on the basis of these data it cannot be concluded that more than one race of perch exists in Lake Erie. Additional evidence will be sought in the comparative study of the growth rates of the yellow perch taken both from the western and eastern end of Lake Erie.

COOPERATIVE INVESTIGATIONS OF WISCONSIN LAKES

For many years the Bureau has cooperated with the Wisconsin Geological and Natural History Survey in limnological investigations of both fundamental and practical value on the lakes of northern Wisconsin. The Bureau's share in the cooperative enterprise consisted of modest financial support, the planning and technical supervision being provided by Drs. E. A. Birge and Chancey Juday of the State organization.

In 1933 the Wisconsin Geological and Natural History Survey received financial assistance for these cooperative investigations from the United States Bureau of Fisheries, Wisconsin Conservation Department, Alumni Research Foundation, and Thomas E. Brittingham, Jr.

The Survey's Trout Lake Laboratory was opened on July 1, and work was continued until September 9. The physical, chemical, and part of the biological investigations were discontinued on August 31, but the plankton and fish researches were continued into September.

The field party consisted of the following individuals: H. C. Baum, E. A. Birge, S. X. Cross, A. D. Hasler, R. Hunt, C. Juday, R. R. Langford, W. E. Militzer, E. Schneberger, H. A. Schomer, John Schreiner, W. A. Spoor, and L. R. Wilson. Dr. V. W. Meloche of the Department of Chemistry spent the greater part of July and August at the laboratory making a special study of some of the chemical problems involved in the investigations. Nine of the 14 members of the field party were working on problems which had a direct bearing on the fish life of the lakes. In addition to the field party, R. J. Allgeier was engaged in making analyses of lake residues in the chemical laboratory of the University of Wisconsin.

In the earlier years of these investigations, a general survey of the lakes of northeastern Wisconsin was made; it included one or more visits to some 530 different bodies of water. This survey was made for the purpose of obtaining some idea of the physical, chemical, and biological status of the lake waters of this district.

The general survey was completed in 1930 and since that time the investigations have been limited chiefly to six lakes representing the different types found in the district. These studies have had as their main objective the physical, chemical, and biological conditions for fish life in these lakes; the work on the fishes themselves has dealt with the kind and quantity of food eaten by the various species, the number and kinds of parasites harbored by them, and the rate of growth of the more common species in the different lakes. During the summer of 1933 another fish problem was added to these, namely, the determination of the total fish population of some of these lakes. Such information is necessary for a study of the fish production and of the fish-carrying capacity of a lake. It will also serve as a basis for experimental work relating to the increase of the carrying capacity of a lake by the use of artificial fertilizers. It will also have a bearing on the problem of stocking a lake with fish.

The details of the program and the results of the year's work are not presented here because of lack of space but may be consulted in the regular reports of the Survey and in the following publications:

BERE, RUBY.
Numbers of bacteria in inland lake waters of Wisconsin as shown by the direct microscopic method. Internat. Revue ges. Hydrobiol. and Hydrog. October.
JUDAY, C. and E. SCHNEBERGER.
Growth studies of game fish in Wisconsin waters. Second Report, April. (Mimeograph form).
JUDAY, C. and E. A. BIRGE.
The transparency, the color and the specific conductance of the lake waters of northeastern Wisconsin. The Wisconsin Academy of Sciences, Arts and Letters, vol. 28.
MELOCHE, V. W. and T. SETTERQUIST.
The determination of calcium in lake water and in lake water residues. The Wisconsin Academy of Sciences, Arts and Letters, vol. 28.
TITUS, LESLIE and V.W. MELOCHE.
A microextractor. Industrial and Engineering Chemistry.

OYSTER INVESTIGATIONS

During the year 1933, oyster investigations under the direction of Dr. Paul S. Galtsoff were continued in Massachusetts, Connecticut, North Carolina, Florida, Louisiana, and Washington. Investigation in Massachusetts and Connecticut, with headquarters at Milford, Conn., consisted in experimental studies on growth and fattening of oysters, and in observations on seasonal changes in the chemical composition of oyster meat. The United States Fisheries Laboratory at Beaufort, N.C., served as headquarters for oyster investigations in the South Atlantic States and Louisiana, where a series of surveys of oyster producing bottoms was made with the view of ascertaining their suitability for the cultivation of oysters. On the Pacific coast, investigations on cultivation of native oysters were carried out at Olympia, Wash. The work of the Bureau was greatly facilitated by the cooperation of the respective State authorities who supplied boats, labor, and laboratory facilities.

GROWTH AND FATTENING OF OYSTERS

Observations and experiments on growth and fattening of oysters were carried out at Milford, Conn., and at Woods Hole, Mass., by P. S. Galtsoff, R. O. Smith, and V. L. Loosanoff. The Connecticut Shellfish Commission continued its cooperation with the Bureau in this research work, assigning the State boat *Shellfish* to assist in field work and providing laboratory facilities at Milford. During the cold season, the State boat was in dock, but field observations were continued through the courtesy of the Connecticut Oyster Farms Co., which provided a suitable boat and assisted in collecting samples. Laboratory work during the winter was carried out at the Osborn Zoological Laboratory of Yale University.

The research facilities at Milford have been materially increased by a construction of two concrete tanks which permitted experimental studies on artificial feeding of oysters and conditions increasing the productivity of the sea water. As a supplement to these experiments, several planktonic organisms were cultivated in the laboratories at Woods Hole, Mass., and Yale University. The purpose of the experiments was twofold; first, to determine the conditions which accelerate propagation of marine algae, thereby increasing the food content of the water, and second, to determine the nutritive value of different forms in the oyster diet. Since the understanding of the natural sequence of seasonal changes taking place in the sea is prerequisite for a successful solution of these problems, observations were continued on changes in water temperature, chemical composition of sea water, plankton content, and growth and changes in the chemical compositions of oysters. Until the end of July 1933 samples were collected at three stations located in Long Island Sound. Since August 1, observations at 2 stations (lots 618 and 644) were discontinued, because oysters were moved by the owners of these lots to other locations.

The results of observations made at weekly intervals show that growth of the oyster continues throughout the year even when the organism is in a state of hibernation. During the year the average total weight of 4-year-old oysters, kept on experimental ground at Charles Island in Long Island Sound, increased from approximately 150 to 250 grams. The increase continued throughout the year, but there were two periods of accelerated rate of growth, one coinciding with the period of gonad formation in June–July, the second one occurring in October–November, at the time of the greatest accumulation of glycogen.

The weight of the oyster shell constitutes from 76 to 81 percent of the total weight of the organism, whereas the weight of its meat fluctuates between 8 and 13 percent. Spawning sharply reduces the weight of the meat from 13 to 8 percent of the total weight, but is immediately followed by a gradual recovery. The maximum weight of the meat was found to occur in November, just before the onset of hibernation. During the period of hibernation there is a gradual decrease in the relative weight of meat.

Simultaneously with the observations on oysters, samples of plankton and water were collected for biological and chemical analysis. Abundant material, accumulated in the course of the investigation, is now being analyzed.

PREDICTION OF SETTING IN LONG ISLAND SOUND

Observations on the development of the gonad, started in 1932, were continued in 1933. Samples of oysters, examined in May and June, showed that the amount of spawn to be discharged was far below normal. Oystermen were notified that poor setting was to be expected, and those who, upon receiving this advance information curtailed their planting operations, saved money because, true to our expectations, there was no setting in the largest section of Long Island Sound.

PROPAGATION OF DIATOMS FOR THE ARTIFICIAL FEEDING OF OYSTERS

Laboratory experiments on plankton as affected by various substances added to sea water were carried out by P. S. Galtsoff, R. O. Smith, V. Koehring, and V. L. Loosanoff. In the majority of the experiments, a pure culture of the small diatom, *Nitzchia closterium*, has been used, but attempts were made to isolate other forms which may be useful in artificial feeding of oysters. At present, the following microorganisms have been isolated and their cultures are being continued in the laboratory: *Nitzchia closterium*, Nitzchia sp. (very small diatom from California), Carteria sp. (green alga, family Chlamydomonadinae), Cromulina sp. (greenish alga, order Chrysomonadinae), and an extremely small, pink microorganism not yet identified. The latter form was isolated from the samples collected on oyster beds in Great South Bay, where oysters developed unusually dark pigmentation.

By using various combinations of inorganic salts and organic substances, a method has been perfected whereby very dense cultures of diatoms can be obtained. At present, the richest culture growing in the laboratory contains 1,400,000 diatoms in each cubic centimeter of water. Under proper light and temperature conditions, this dense population can be maintained almost indefinitely by withdrawing every day a portion of the culture and replacing it with an equal amount of solution. It is intended to apply this method in producing large quantities of diatom cultures and in using them for artificial feeding of oysters.

THE USE OF SLAG IN OYSTER CULTURE

A series of experiments was performed with slag, a byproduct of the steel industry, which has been recently brought to the attention of oyster culturists as a material suitable for cultch. Experiments carried out at Onset and Wareham River, Mass., showed that oyster larvae readily attach to the surface of slag and grow well. Its presence in water may increase the productivity of oyster beds, because slag has been found not only to promote the growth of diatoms, but to maintain it for longer periods than in the control cultures. The presence of slag on oyster beds is therefore of double advantage, serving as a source of nutriment to the oyster food as well as material for the attachment of spat.

The growth promoting factors of slag may be extracted by repeated boiling in sea water—diatoms growing rapidly in the filtrate. Untreated slag lumps as they are received from the mills are highly favorable to growth. Some of the growth-promoting factors of slag seem to be removable by alcohol washing, as growth in cultures containing alcohol-washed slag, while more prolonged than the growth in the controls, is not so rapid as in cultures containing untreated slag.

OYSTER PLANTING IN NORTH CAROLINA

In order to rehabilitate the depleted natural oyster beds of this State, transplantation of seed oysters has been carried out under the direction of Dr. H. F. Prytherch, in cooperation with the North Carolina Department of Conservation and the Civil Works Administration. These operations have been conducted in 5 coastal counties where during December 1933 a total planting of over 272,000 bushels of seed has been made at an average cost of aproximately 9 cents per bushel. In order to maintain production of the areas from which seed oysters have been obtained, large quantities of old oyster shells have been scattered over the bottoms to provide a place of attachment for subsequent generations of this shellfish. The planting of seed oysters and shells will be continued during 1934, with funds provided by the Civil Works Administration. Up to the present time, this work has provided employment for 266 of the oyster fishermen of this section. Experimental oyster farming operations conducted by the Bureau during previous seasons have served as a guide in the selection of suitable planting bottoms and in the adoption of the most practical and efficient methods for the rehabilitation and future maintenance of this valuable natural resource.

At the Beaufort laboratory an improved method of opening clams has been developed by Dr. V. Koehring and Dr. Herbert F. Prytherch. It has been found that clams may be easily opened by immersing them in a warm bath of fresh or sea water having a temperature of 105° F. In these experiments 100 percent of the clams opened their shells in from 10 to 20 minutes and when removed from the bath a few minutes later were completely narcotized. The meats could then be removed with comparative ease and were alive and in as fine condition as if they were opened raw. This process is suitable for either the raw trade or canning of hard clams and will be tested on a commercial scale in the near future.

OYSTER INVESTIGATIONS IN FLORIDA

During April and May, extensive oyster farming operations were conducted by Dr. H. F. Prytherch in the region from Panama City to Pensacola in cooperation with the Florida Department of Conservation. Previous studies made by the Bureau in Choctawhatchee Bay disclosed a scarcity of old shells or suitable objects to which the spawn of the oyster might attach, and indicated the necessity of planting shells and seed oysters in this area to create and extend natural beds and utilize the barren bottoms that are suitable for cultivation of this shellfish.

A survey was made of the principal oyster producing areas in the Pensacola region including East Bay, Blackwater Bay, and Escambia Bay. Excellent conditions for oyster propagation and the production of a high grade marketable product were found in East Bay and recommendations were offered for the development of this region by transplantation of seed oysters from the natural beds in Blackwater and Escambia Bays. In the vicinity of Panama City serious depletion of the natural beds in North Bay and East Bay was observed. Rehabilitation and future maintenance of these can be accomplished by regularly restocking them with seed and shell and by enforcement of the cull law. An adequate supply of seed for this purpose was found on the overcrowded oyster reefs in nearby waters such as West Bay.

Biological studies of oyster spawning and setting were made in all the previously mentioned waters which showed that shell planting operations should be carried out during April and May.

OIL POLLUTION INVESTIGATIONS IN LOUISIANA

At the request of the Louisiana Department of Conservation the Bureau has undertaken an investigation to determine the cause of the recent oyster mortality in Terrebonne Parish and its possible relation to oil-well pollution of these waters. Oyster planters operating in the vicinity of the oil wells in Lake Pelto and Lake Barre suffered a heavy loss of their stock during the winter of 1932–33 and to a lesser degree during the previous winter.

A preliminary survey of this region by Dr. Prytherch in May 1933 showed that 50 to 95 percent of the adult oysters on the planted beds, had died previously but no direct relation could be established between the degree of mortality on these areas and their distance from the oil wells. Pollution of the water by oil, brine effluent, and gas (H_2S) was greatest in the vicinity of the Lake Barre wells, and yet live oysters were found on the piling of these wells and on a natural bed in their immediate vicinity.

The problem is further complicated by the fact that the mortality was limited chiefly to the larger oysters and that the natural enemies, the boring sponge and boring clam, which heavily infested most of their shells, were apparently unaffected under the same conditions. A severe attack of these enemies lowers the vitality of the oyster and it is believed that such a condition was an important contributing factor in the mortality of many of these oysters.

On several beds, however, a high death rate occurred where there was no evidence of the boring sponge or clam. Fortunately it was possible to obtain samples of weak surviving oysters from these areas and others for miscroscopical studies, which have subsequently shown that the tissues of the muscle and gills were heavily infected with a minute protozoan parasite. Studies are being continued of the life history and occurrence of this protozoan parasite in Louisiana oysters and its possible relation to recent mortality.

EXPERIMENTAL STUDIES OF OIL-WELL POLLUTION

Since pollution of the waters of Terrebonne Parish was coincident with the oyster mortality, it was necessary that laboratory experiments be conducted to determine whether the different polluting substances, crude petroleum, brine water and hydrogen sulphide, are toxic to oysters and other marine animals and in what concentration. At the Beaufort Laboratory this work has been in progress since July and has shown that (1) oysters, clams, and numerous marine invertebrates will survive and grow in water covered with a heavy film of crude petroleum; (2) shellfish are not killed when fed on suspensions of these oils and show no cessation in growth of shell; (3) oysters survive when completely immersed in oil once each hour over a period of 6 weeks; and (4) oysters and clams will grow on mud and sand bottoms saturated with different grades of oil. These experiments are being continued.

The most serious pollution from the oil wells is apparently the brine water extracted from the petroleum. The effect of the different brines on feeding, growth, and shell movements of the oyster are being investigated. Though small amounts have been found to be nontoxic to larval, spat and adult oysters over a short period of time, general conclusions cannot be drawn until the effects over a prolonged period have been determined. Dilute solutions of brine of the same salinity, pH, and oxygen content as sea water were found to be toxic to oysters and produced death in from 6 to 10 days.

OYSTER INVESTIGATIONS IN WASHINGTON

Investigations on the spawning and setting of the native oyster of the Pacific coast were continued at Olympia, Wash., under the direction of Dr. A. E. Hopkins. Accurate records have been kept during 3 seasons of the 2 most important oyster-producing bays near Olympia, and in 1933 similar observations were made in 2 additional bays. The results already are being employed by oyster growers to assist in determining the correct time to plant cultch for the collection of seed. Owing to the short summer in 1933 the setting season was only about half as long as in the 2 years preceding. While in 1932 between 160 and 170 broods of larvae were produced per 100 adults, showing that most of them spawned twice, in 1933 only about 75 percent produced broods during the entire season. The number of larvae released in 1933 was less than half as great as in the previous year, thus limiting the possible catch of seed.

In Oyster Bay spawning started just after the middle of May, but the larvae did not begin to set until July 3. As in the last 2 years, definite periods of setting occurred, as shown by counts of spat caught on shells planted at frequent intervals. Although there is considerable variation in the results for the 3 seasons studied, it appears that there are characteristically, in this bay 2 distinct setting periods: The first, at the beginning of the season, and the second, about 5 to 6 weeks later. In addition, secondary periods may occur either between or after these two. Results from two other bays, Oakland Bay and Little Skookum, studied in 1933, agree closely with Oyster Bay in time of occurrence and relative intensity of the setting periods.

On the other hand, Mud Bay, which has been studied extensively, appears to be entirely different with respect to spawning and setting, although there is little difference in the temperature and salinity of the water. In 1933 there was only 1 setting period, beginning July 25 and continuing for about 3 weeks, after which no setting of any importance could be observed. This appears to represent the typical season in this bay, for it is usually unsatisfactory as a producer of seed.

The time required for setting of larvae after their release into the open water appears to vary considerably from year to year and in different bays. From the time of beginning of spawning until the first spat were found there was in Oyster Bay in 1932 a period of 39 days while in 1933 it was 47 days. In each year 4 days longer were required in Mud Bay. Presumably this time depends upon environmental factors as yet not thoroughly understood.

The occurrence of periods of setting appears not to depend primarily upon corresponding spawning but upon tidal cycles. Analysis of the records of setting in all of the bays studied shows that setting periods occur during runs of extreme tides. Preliminary experiments were made to determine what factors favorable to setting are controlled by the tidal cycles, but with inconclusive results.

Experiments on the effect of changes in salinity on the feeding activity of the Pacific oyster were continued. It was found that if the salinity is reduced from about 28 to about 15 per mille adaptation is extremely slow, requiring many days, while a change from a lower to a higher salinity permits recovery within a few hours. It is probable that adaptation to such a low salinity is not so complete that feeding may continue as rapidly as in the higher salinity. If placed in water of a salinity of about 10 per mille, feeding appears to cease completely, though the shell may remain open and shell growth continue. Specimens have been kept in this low salinity for as long as two weeks without any indication of adaptation of the feeding mechanism, and even after being returned to more favorable water recover only very slowly. It is thought that these results will throw considerable light upon the problem of locating oyster beds in places where the oysters will fatten properly.

INVESTIGATIONS ON AQUICULTURE

The investigations originally undertaken in connection with fish cultural operations at the hatcheries have been expanded recently to include field studies dealing with the many and diverse factors which affect fish in their natural environment. This is a logical expansion of the work, since it is obvious that the welfare of the fish after being liberated in natural waters is fully as important as the efficient operation of our hatcheries. It is evident that no matter how successful our hatchery operations may be, the success or failure of artificial propagation in terms of catchable fish is determined eventually by conditions in the streams or lakes in which the fish are planted.

The experimental hatcheries at Leetown, W.Va., and Pittsford, Vt., are fortunately situated to serve as headquarters for field investigations, since each is located in a region noted for its excellent fishing. Within a short distance of the Pittsford station in the heart of the Green Mountains, there are many famous trout streams, while both trout and bass waters are readily accessible from the Leetown station. Extension of these field studies will be greatly accelerated by an allotment from the Public Works Administration for stream surveys and stream improvement work during the summer of 1934.

In addition to the field work, investigations dealing with the various fish-cultural problems are being conducted as in the past. This work is conducted under the general direction of Dr. H. S. Davis.

POND-FISH CULTURE

Owing to drastic reduction in the Bureau's appropriations, all experimental work at the Fairport station was discontinued on July 1, 1933, when Dr. A. H. Wiebe, formerly in charge of this station, severed his connection with the Bureau. Consequently the only investigations during 1933 on the propagation and rearing of bass were carried on the Natchitoches (La.) station. These investigations were conducted by O. Lloyd Meehean and were a continuation of those carried on at the Tishomingo (Okla.) station during the summer of 1932. This transfer was deemed advisable on account of the better facilities for experimental work afforded by the Natchitoches station.

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The experiments at Natchitoches afford the most clear-cut evidence of the influence of fertilization on fish production that has yet been obtained. The results show that both the number and size of the fish produced in a pond are directly proportional to the amount of fertilizer added. The results from 7 ponds, each with an area of approximately 0.85 acre, are available for comparison. Three of these ponds were fertilized with cottonseed meal at frequent intervals during the spring and early summer. A fourth pond received 1½ tons of cow manure at the beginning of the season. The other 3 ponds were unfertilized except for a small amount of cow manure early in the spring. The pond which received the largest amount of cottonseed meal (905 pounds) produced 12,245 fingerling bass per acre, which was the largest production obtained from any pond. A second pond, fertilized with 685 pounds of cottonseed meal, produced about 11,000 fingerlings per acre. The third pond received only 498 pounds of cottonseed meal and produced approximately 6,400 fish per acre. The pond which was heavily fertilized with cow manure early in the season produced only 2,941 fish per acre. The unfertilized ponds with one exception produced less than 3,500 fingerlings per acre.

The growth of the fish in the ponds fertilized with cottonseed meal was in direct proportion to the amount of fertilizer added. The pond which received the smallest amount of fertilizer produced the fewest and smallest fish. The pond fertilized most heavily and for a longer period than the others produced the largest fish and also the greatest number per acre. The fish from unfertilized ponds were not only fewer but smaller than those from fertilized ponds.

It is a noteworthy fact that the fish from the unfertilized ponds made much of their growth early in the season, since these fish were as large on May 24 as the others on July 25, just 2 months later. It is also of interest to find that fish in the fertilized ponds stopped growth shortly after fertilization was discontinued early in the summer.

As might be expected, a direct correlation was found between the number of food organisms in a pond and the amount of fertilization. It appears that the weed and bottom habitats are about equally important in the production of food organisms. This is of interest in connection with the control of aquatic plants in ponds.

Experiments with sodium arsenite were conducted to determine the relation of pH and alkalinity to the amount of the chemical to be used for the control and extermination of weeds in various waters. It was found that these are not the only factors affecting the results, since some other interfering substance is important in influencing the amount of sodium arsenite required. No information as to the nature of this substance has yet been obtained, but it is evidently something outside of those tested for regularly, since the difference in treatments could not be correlated with any of these.

It was also found that in order to make the sodium arsenite treatment effective it was first necessary to control the algae. This was best accomplished by a thorough mixing of copper sulphate in the surface water by agitation of the bag containing the chemical.

Investigations regarding the possibility of using fresh-water shrimp (Palaemonetes) as a forage food in bass ponds indicate that this will not be feasible under present conditions. These animals are not adapted to transfer from one habitat to another, while their small size makes them easy prey for the fish, resulting in almost total loss of brood stock. Shrimp are very sensitive to differences in pH and quickly die when transferred to waters showing a material difference in this respect from their original habitat. This is true even though the water may have an abundant supply of dissolved oxygen.

TROUT CULTURE

Feeding experiments.—As in 1932, feeding experiments were carried on at the Pittsford (Vt.) station under the direction of R. F. Lord and at the Leetown (W.Va.) station under the direction of E. W. Surber. Both brook and rainbow trout were used in these experiments. Several lots of Loch Leven fingerlings were also carried on experimental diets at the Leetown station.

Since previous experiments have demonstrated conclusively that better results can be obtained when certain dry products are included in the diet than by feeding fresh meats alone, the experiments in 1933 were primarily designed to determine the level at which these dry products can be fed most efficiently and economically. Unfortunately, owning to the limited funds available for experimental work, it was necessary to discontinue the experiments at both stations early in September.

As has been emphasized in previous reports, there is no dry product available commercially which can be fed to trout successfully for any considerable length of time without the inclusion of raw meat in the diet. With large fingerlings and older trout only 15 to 25 percent of raw meat is required to keep the fish in healthy condition. Unfortunately, mixtures containing such a small percentage of meat cannot be fed without considerable waste and it is consequently more economical to include a larger amount of raw meat than is necessary for the well being of the fish. The meat not only makes the ration more palatable to the fish but serves as a binder to hold the fine particles of meal together so they can be eaten readily. When the proportion of the meat is too small, the mixture quickly disintegrates in the water and much of the dry food is lost.

As in previous years, salmon-egg meal gave the best results of any dry product used, although, with regard to growth, there was very little difference between this product when used alone and a mixture of equal parts salmon-egg meal and a good grade of meat meal. Meat meal alone was somewhat inferior to salmon-egg meal.

The results of the experiments show that as high as 60 percent of dry meal may be economically incorporated in the diet. For instance, one lot of yearling rainbow trout, on a diet composed of 60 percent salmon-egg meal and 40 percent raw pig liver, gained 153 percent in weight from June 7 to September 1, while a second lot, on a diet composed of equal parts pig liver and salmon eggs, showed an increase of only 143 percent during the same period. The conversion factor was slightly better when the larger amount of salmon-egg meal was used, since it required 2.1 pounds of food to produce a pound of trout when this product was fed at a 50 percent level, and only 1.9 pounds when fed at a 60 percent level. When the dry constituent of the diet is still further increased, the mixture disintegrates so readily that it is very difficult to feed without considerable waste.

Since it is a universal practice to feed rapidly growing fish all they will eat, experiments were run at both the Pittsford and Leetown stations to determine if a reduction in the amount of food would result in its being utilized more efficiently. The results are inconclusive, although indicating that probably a somewhat greater efficiency can be obtained by feeding slightly less than the fish will consume readily. In the case of brook trout fingerlings, 2.4 pounds of food were required to produce a pound of fish on a diet of beef liver and salmon-egg meal when the fish were fed all they would eat readily. In another lot of trout on the same diet but given 25 percent less food than the former lot, 2.3 pounds of food were required for each pound of fish produced. Rainbow fingerlings made a better showing, since the amount of food required to produce a pound of fish was 2.8 and 2.1, respectively. In the case of brook fingerlings at the Leetown station on a similar diet, 2.57 pounds of food were required for each pound of fish produced, when the fish were given all they would eat, and 2.67 pounds when fed 25 percent less. The rainbow fingerlings again made a much better showing. In this case 2.58 pounds of food were required for each pound of fish produced when the fish were fed all they would eat, while only 2 pounds were required when the amount of food was reduced 25 percent.

With rainbow yearlings at the Pittsford station, a reduction of 10 percent in the amount of food in the case of fish fed a mixture of equal parts of pig liver and salmon-egg meal, resulted in 1.8 pounds of food to 1 pound of trout as compared with 1.9 pounds in fish fed the larger amount. When fed pig liver a considerably larger amount of food was required to produce a pound of fish, when the amount was reduced 15 percent, 10.6 pounds being required when the fish were fed the full amount and 13.7 pounds on the reduced diet.

It is scarcely necessary to point out that the growth on the reduced diets was considerably less in every case than that of fish fed all they would readily consume. It should be emphasized, however, that in no case were the fish overfed. The fingerlings were given only as much food as they would readily eat twice a day, while the yearling trout were fed only once a day.

In an effort to clear up some of the uncertainty regarding the amount of food required to support trout in nature, a number of brook and rainbow trout fingerlings at the Leetown hatchery were kept on natural food from May 3 to October 12. The food of these fish consisted principally of the water sawbug (Asellus) with some gammarus and a few snails. A supply of these organisms was kept in the troughs at all times so that the fish had all they could eat. Within 3 weeks after the experiment was started, the color of these fish was noticeably brighter and within a short time they became the most highly colored fish at the station, in fact, the colors were much more intense than those of the average wild trout.

At the end of the experiment the average individual weight of the brook trout was 33 grams and of the rainbow trout 34.5 grams.

It was found that in the case of brook trout 6.9 pounds of food were required to produce a pound of fish, while with the rainbow trout 7.4 pounds were required to produce the same amount. On a dry basis it required approximately 1.86 pounds of food to produce 1 pound of fish in the case of the brook trout and 2.05 pounds in the case of the rainbow. The less efficient use of food by the rainbow trout may possibly be caused by the greater activity of this species.

Selective breeding.—Experiments in selective breeding of brook trout were continued at the Pittsford station along much the same lines as in previous years. As pointed out in some detail in the report for 1932, rigid selection for two generations has resulted in a notable increase in rate of growth and egg production. In fact, the improvement in these respects has been much greater than it was thought could possibly be accomplished in such a brief time. In view of the success of these experiments at Pittsford, the same methods of selective breeding are being extended to rainbow and brown trout at the Leetown station. This is the first season trout have spawned at this station, the oldest fish being only 2 years old.

In order to obtain a fair comparison of the growth of selected and nonselected fish, three lots of brook trout fingerlings were reared at the Leetown station under as nearly identical conditions as possible with respect to food and water supply. Each lot, containing 1,200 fingerlings, was placed in a standard hatchery trough on March 1, where the fish remained until the experiment was discontinued. Two lots of fish were from eggs taken at the York Pond (N.H.) station. One lot of these eggs was from fish which had been reared from wild trout; the second lot from fish still farther removed from the original wild stock. The third lot of eggs was taken from selected stock at the Pittsford station.

From the beginning of the experiment the fish from the Pittsford station grew more rapidly than those from the York Pond station. There was practically no difference in the growth of these two lots of fish. The experiment was discontinued in August when the fish in each lot were 29.5 weeks old. At this time the average individual weight of the Pittsford fish was 11.5 grams. The weight of one lot of York Pond fish was 4.9 grams and the other lot 4.6 grams. There was also a marked difference in mortality, which in one lot of York Pond fish totalled 718 and in the other 546. The loss among the Pittsford fish was only 169 during the same period. The mortality in all three lots was abnormal, but no attempt was made to correct it by treatment of any kind. The higher mortality among the York Pond fish should have given them the advantage with respect to growth so the fact that the Pittsford fish grew almost twice as fast is all the more notable.

Hatchery techinque.—In an effort to determine the number of young trout which can be handled most economically in hatchery troughs, four troughs at the Leetown station were stocked with rainbow fingerlings as follows: Trough no. 1 received 500 fish; trough no. 2, 1,000 fish; trough no. 3, 2,000 fish, and trough no. 4, 3,000 fish. These fish were all from the same lot, with an average weight of approximately 1 gram at the beginning of the experiment. All 4 lots of fish grew at about the same rate until April 26 when the fish in no. 4 trough were found to weigh approximately 0.3 gram less than those in the other troughs. From this time on the slower growth of the larger lots became more and more noticeable, until on July 10 it was necessary to discontinue the lot in trough no. 4 on account of an outbreak of bacterial gill disease.

The average individual weight of the fish in each lot on July 5 was as follows: Trough no. 1, 14.26 grams; no. 2, 13.27 grams; no. 3, 11.15 grams; and no. 4, 8.89 grams. The mortality up to the time of the outbreak of the gill disease in trough no. 4 was in all cases too small to be of any significance. The results show clearly that overcrowding not only retards the growth of the fish but also increases their susceptibility to disease.

A series of experiments were carried out at the Leetown hatchery to determine the amount of oxygen removed from the water in troughs containing various numbers and sizes of fingerling trout. The complete results cannot be given here, but a few examples may be of interest. The troughs were supplied with water having a temperature of 54° F. at the rate of 5.17 gallons per minute. In one trough containing 1,500 brook trout with an average individual weight of 13.45 grams, 5.78 parts per million of oxygen or 60.02 percent of the total amount in the water was removed by the fish. In another trough containing 20,461 rainbow fingerlings with an average individual weight of 0.24 grams, the amount of oxygen removed was only 1.4 parts per million or 12.5 percent of the total amount. In a third experiment 3,900 black spotted trout fingerlings, averaging 2.33 grams in weight, removed 1.88 parts per million of oxygen, or 18.02 percent of the total amount present.

Feeding greatly increased the consumption of oxygen, as shown in the case of a trough containing 1,500 brook trout, with an average weight of 13.45 grams. On the morning of November 28 after these fish were fed 300 grams of food, 7.26 parts per million of oxygen were consumed in this trough. At 4:05 p.m., several hours after feeding, the consumption of oxygen in the same trough was only 4.72 parts per million, or 44.74 percent. At this time the fish were again given 300 grams of food, and the oxygen consumption rose to 8.55 parts per million, or 81.04 percent of the total amount present. It is evident from these experiments that in overcrowded troughs there is a distinct possibility that during or shortly after feeding the oxygen content of the water may drop to dangerously low levels even though at other times the supply may be more than sufficient for the needs of the fish.

A self-cleaning device for use in circular pools has been developed by Mr. Surber, which it is believed will greatly simplify the operation of this type of pool. The device consists of a large sleeve, which is attached to the outlet pipe and extends for a short distance above the surface of the water. At the bottom there is a small opening between the sleeve and a sloping flange which rests on the bottom of the pool. The width of this opening can be easily adjusted according to the size of fish in the pool. Excrement and waste material are drawn through the opening by the water flowing through the outlet pipe, thus automatically keeping the pool clean and in good sanitary condition.

Field studies.—A quantitative study of rainbow trout production in a small spring-fed stream near Leesburg, Va., was made by Mr. Surber. This stream has been turned over to the Bureau by the owner for experimental purposes, and all fishing except by authorized persons is prohibited. Trout are prevented from leaving the stream by a revolving screen at the lower end. However, owing to severe floods, the operation of the screen during the fall and winter of 1932–33 was so spasmodic that it is believed that the screen had little effect in retaining the fish.

A total of 49 pounds of fish, over 7 inches long, were removed from the stream during the season, or an average annual production of approximately 30 pounds per acre. It is known that a number of large trout were left in the stream so that the total production was undoubtedly somewhat greater. A study of the stomach contents of these fish shows that although amphipods and aquatic insects were abundant, the trout during the summer fed almost entirely upon terrestrial insects.

In connection with the field work at the Pittsford station, an arrangement was made with the Middlebury College, Middlebury, Vt., for the development of a program for improving trout fishing in the streams under the control of the college. Most of these streams are in the Battell Forest, a beautiful tract of over 30,000 acres, located on both slopes of the Green Mountains. Owing to the limited funds and personnel available for this work during the summer of 1933 it was only possible to make a preliminary investigation of the more important streams in the forest. A more complete study of the streams to be followed by a systematic program of stream improvement will be undertaken in 1934.

During the summer of 1932 a number of marked yearling brook trout were liberated in an excellent trout stream adjoining the hatchery grounds at Pittsford to determine if domesticated fish could care for themselves under natural conditions as well as wild fish and also if they would afford equal sport to the angler. The results were of such interest and value as to suggest the advisability of conducting a similar experiment with rainbow trout. Accordingly, on September 3, 1933, 100 marked yearling rainbow trout were set free in the same section of the stream in which brook trout had been liberated the previous year.

Observations made on these fish shortly after they had been liberated showed a much greater tendency to scatter than in the case of the brook trout. They were also more difficult to take on fly and on only 1 day during the course of the experiment was it found possible to capture the desired daily quota of 10 fish. Fishing was continued with varying intensity up to September 26. During this period the total number of marked fish taken was only 49, and in order to capture this number it was found necessary to resort to bait in a number of instances.

In general the rainbow trout reacted quite differently from the brook trout in the previous experiment. Especially noteworthy was the much greater tendency to move downstream with the current. For example, 59 percent of the fish recaptured were taken below the pools in which they had been liberated; 29 percent from the pools themselves; and only 13 percent had moved upstream from the point of liberation. On the other hand, in the case of the brook trout, 61 percent were taken upstream from the pools where liberated; 23 percent from the pools themselves; and only 16 percent had moved downstream.

Complete observations on this experiment will not be available until after the freshets in the spring of 1934, but it has already shown conclusively that hatchery reared rainbows, as well as brook trout, are fully able to care for themselves when thrown on their own resources.

California trout investigations.—The investigations of problems relating to the trout of California were carried on with the same personnel as in 1932. As a result of experience gained during the past year, it has been decided to modify in several important respects the program originally adopted for the investigations. Briefly the program as now developed calls for intensive work on two major projects with additional work on several minor projects, which will be carried on as time permits. One of the major projects which is concerned with trout problems relating to Sierran lakes and streams is under the immediate supervision of Dr. P. R. Needham, who is also in charge of the California investigations as a whole. The other major project is under the immediate direction of A. C. Taft and deals primarily with problems relating to sea-run steelheads. This project includes extensive studies in several coastal streams with especial attention to the Klamath River.

The minor projects include the planting of large numbers of marked trout in the Truckee River and Angora Lake, experiments in developing selected strains of California trout at the Hot Creek rearing ponds in Mono County, and the development of a stocking policy for water reservoirs near San Diego.

Work on environmental conditions in trout streams carried on during the past year has brought to light a number of new and interesting facts. Seasonal food studies made in Waddell Creek near Santa Cruz in August, November, March, and May, give a yearly average of approximately 198 pounds of insect food per acre of riffle area. Pools produced only 54 pounds per acre. On the other hand, Waddell Creek Lagoon averaged over 250 pounds per acre. While this stream produces principally insect food above the brackish water area, lagoon foods consisted almost entirely of crustaceans, of which 2 amphipods, *Gammarus confervicolis*, and *Corophium spinicorne*, and 1 isopod, *Exosphaeroma oregonensis*, offer abundant food to young salmonoids. In numbers, an average of over 10,000 crustaceans were found per square meter in the lagoon bottom, while the riffles in the stream above averaged only about 6,500 organisms to the same area.

In the Feather and Merced Rivers about the same amount of food was found to be present in winter as in summer, slightly more being present in winter. Streams in northern California, both coastal and Sierran, were found to be much richer in food than Sierran and coastal streams in the central and southern parts of the State.

The steelhead studies started at Waddell and Scott Creeks in 1931 have been continued. These two streams which are small in size and very similar in physical characteristics offer particularly favorable conditions for experimental work. One stream, Scott Creek, has been closed for years by an impassable dam near its mouth where all ascending steelhead are trapped and spawned. During the past summer a dam was constructed on Waddell Creek which will automatically trap all adult fish migrating upstream and will also capture a portion of the downstream migrants. In this stream the adult fish, after being measured and tagged, will be allowed to proceed upstream and spawn naturally. It is hoped in this way to obtain, among other things, accurate data on the comparative efficiency of natural and artificial propagation.

During the period January to May 1933, 82 adult steelhead trout of the 614 tagged the previous year returned to the station on Scott Creek. These fish had been tagged on the gill cover with a no. 3 strap tag. Of these 82 fish 61 percent returned carrying the tag, and the balance were recognized by the hole in the abraded area where the lost tag had been attached. During the same period 368 fish were tagged after spawning, including the fish previously tagged. On these fish the celluloid disk tag attached by a nickel wire just below the base of the adipose fin was used. In addition to the work on the adults, 11,000 yearling fish were marked and planted in the lagoon.

Some field work was done on the Klamath River during the summer, and arrangements were made to hold fish in the Fall Creek hatchery for marking experiments during the coming spring. It is planned to expand the work on the Klamath considerably during the coming year.

FISH DISEASES

Studies of the bass tapeworm at the Fairport (Iowa) station, started in the summer of 1932 by Dr. Frederic F. Fish, were continued during the spring of 1933. These investigations show that this tapeworm has not caused serious injury to the bass at Fairport.

A detailed study of the causes underlying the heavy loss of bass fry in the nursery ponds indicated that protozoan parasites, particularly Cyclochaetea, are largely instrumental in causing such losses, and it was concluded that as a routine practice all fish should be dipped in a salt solution before they are placed in ponds. It was also found that smaller quantities of fry should be handled during the process of counting and weighing than has been the practice in the past.

Later in the season Dr. Fish made an investigation of a trout disease at the Cortland (N.Y.) station which caused a heavy loss among the fingerling trout. The disease is characterized by external lesions not unlike those of furunculosis and consequently has apparently been confused with it. However, detailed studies of the pathology of the disease show very clearly that it is quite distinct from furunculosis. Like furunculosis, it is highly pathogenic to many species of trout and has apparently caused serious losses at several hatcheries in New York State. The disease is evidently of bacterial origin, and several species of these organisms were isolated from the tissues. Although one of the organisms isolated from diseased fish is pathogenic to trout, it has not yet been demonstrated that it is the primary cause of the disease.

One of the greatest objections to the use of rearing ponds for trout fingerlings is the difficulty of treating the fish should they develop an external infection, such as gill disease. Removal of the fish and dipping by the methods now in general use is a laborious process and also results in many fish being severely injured by handling.

A method of treating fish in pools by allowing a chemical solution to flow into the pools at a uniform rate has been developed by Dr. Fish. The essential part of the device is a floating siphon, the proper concentration of the chemical in the pool being obtained by adjusting the strength of the original solution to the volume of flow. This is a very simple device and can be readily adapted to almost any type of pool. In this method the fish are treated for a considerable length of time with a very weak solution, which at the concentrations ordinarily used in the so-called "dipping method", would prove fatal in a few minutes.

A very efficient cure for bacterial gill disease has been developed at the Leetown station by Eugene W. Surber. This consists of treating the fish with chlorine gas dissolved in water at a concentration of 1 to 2.5 parts per million. Since this solution is quickly fatal to fish, the chlorine must be neutralized by the addition of sodium thiosulphate after 1.5 to 2 minutes. This treatment has been used with great success in circular pools and also in hatchery troughs. It has not yet been tried in other types of pools, but there appears to be no reason why it could not be successfully used wherever there is a rapid circulation of water.

COOPERATIVE STUDIES OF THE NUTRITIONAL REQUIREMENTS OF TROUT

Investigation of the problems connected with the feeding of trout in hatcheries, which were begun during the summer of 1932, have been continued during 1933 by Dr. C. M. McCay and A. V. Tunison at the Bureau's fish cultural station near Cortland, N.Y. This is a cooperative project conducted under an agreement between the U.S. Bureau of Fisheries, the New York Conservation Department, and the New York College of Agriculture at Cornell University. Special attention has been given to the nutritional problems as well as to the actual feeding experiments, in order to extend our knowledge of the principles of trout feeding beyond that obtained from the Bureau's older experiments of a practical nature in the same field. During the year the hatchery equipment has been altered and improved and electric power is now available. The latter is of considerable importance, since it provides means of controlling the physical environment of the fish that is essential in certain experiments and reflects the general tendency in all nutrition laboratories toward a better appreciation of the importance of such control.

While the work of the investigators was confined as far as possible to the field of nutrition, attention was given to the prevention of disease. Deficient diets inevitably lead to disease which may manifest itself as a distinct alteration in the anatomy and physiology of the trout, or may result in a secondary invasion of the sick fish by parasites; all of which tends to confuse the results obtained from experiments in nutrition. Moreover, the cure of disease may often lie in the hands of the nutrition student. Hence, the practice has been followed of treating the trout in the Cortland hatchery at weekly intervals, thus preventing to a large degree epidemics that otherwise would interfere with the experiments. Care has also been exercised to prevent the introduction of disease by importations of trout or eggs from various sources during the year. Moreover, in order to avoid the needless complication of iodine deficiencies in experimental diets, the practice has been followed of including in the rations each day from 0.1 to 0.2 milligram of potassium iodide per kilogram of live trout.

The major activities of the station were concerned with numerous experiments in three general categories: (1) Experimental feeding tests to determine the utility and value of various dry foods of animal and vegetable origin used as supplements to the regular meat diets and the reactions of various species of trout to these foods; (2) studies to determine the efficiency of conversion of commercial feed combinations in trout; and (3) studies concerned with the vitamin and mineral requirements of trout. No attempt will be made to present in detail the findings of these investigations for the information is being assembled for publication elsewhere, but only the general character of the work and the more striking results attained will be indicated.

During the previous season experiments were started to determine the relative growth of trout species on diets of meat and dried milk products. These experiments were run to compare the relative merits of dry buttermilk and dry skim milk when fed with equal parts of cottonseed meal and fresh meat, to compare the relative merits of spleen, heart, and liver as supplements for a mixture of dry buttermilk and cottonseed meal, and to compare the growth rates of rainbow, brook, and brown trout fed the same diet and surrounded by the same physical conditions. These experiments were undertaken again using fish of the same size which were placed upon experimental diets within a short time after the first feeding. Some of these experiments ran for 20 weeks and others for 60 weeks. Growth curves representing the mean of 400 individuals during the first 16 weeks and 200 individuals thereafter indicate that spleen and heart during such a period are as satisfactory as liver in supplementing cottonseed meal and dry skim milk. The dry buttermilk and dry skim milk proved of equal value for growth, although the latter is a better binder for dry feeds.

Using a diet of cottonseed meal, dry skim milk, and fresh meat (raw sheep plucks) in equal parts it was found that for 24 weeks brown trout grew more slowly than brook trout. An improved experiment using a more suitable diet for fry, which consisted of a mixture of fresh beef liver, 2 parts, and dry skim milk, 1 part, and using 500 fry for each experiment was continued for 40 weeks. The four species—brook, rainbow, lake, and brown trout—were used. Growth curves based on dry weight for the smaller sizes and live weight for the larger fish indicate virtually parallel growth rates for all species, although the brown trout during the latter weeks showed a somewhat reduced growth.

Beginning with their first feeding 425 fry were fed various diets for 24 weeks and the growth rates determined on both the dry weight and the fresh live weight basis. A diet of fresh beef liver and dry skim milk, 2:1, was used to determine if two daily feedings of such a diet were satisfactory. Although the growth curve showed good results, it was below the maximum. A diet of fresh beef liver and dry skim milk, 1:2, was fed 6 times daily as a basis of comparison for the growth rate obtained from feeding fresh beef liver and dry whole milk, 1:2. This experiment with whole milk was included to see if butter fat, which is present in the whole milk but very low in the skim milk, might not be advantageous in feeding young trout. This butter fat provides a diet richer in calories as well as the fat soluble vitamin A. In this combination, however, liver seems to provide adequate supplies of this vitamin, since the growth curves in the two experiments were identical.

At the same time another lot of trout was fed dry skim milk and raw egg in the ratio of 1:1 to test eggs as a source of the growth factor H, which is destroyed in the usual drying of fresh meats. No appreciable difference in growth rates was observed. Another diet consisted of dry skim milk, cottonseed meal, and white-fish meal in the ratios 2:1:1, fed regularly with a change to the diet of dry skim milk and fresh beef liver once a week. A slow growth rate from this diet was observed for the first 3 months, but after that the curves ran parallel with those obtained from better diets. The spray process of dry skim milk 92 percent, and vacuum dried beef liver 8 percent, was combined for the diet of another experimental lot. The liver was dried under 80° C. in an atmosphere of nitrogen. It was then stored under carbon dioxide until ready for use, in order to determine whether factor H found in fresh liver could be preserved in this way. For the first 20 weeks these fry grew very rapidly, but at the time they were approaching a mean weight of 2 grams their growth became very slow and they started dying rapidly. These experiments show that fry can pass through the early stages with excellent growth upon a dry diet, but even with the careful treatment it received the liver seemed to have lost much of its factor H.

In experiments started during the previous year growth curves were constructed for trout fed upon mixtures of dry buttermilk, skim milk, cottonseed meal, and peanut meal. Data were then available only for 16 weeks, but these groups of trout were continued for 8 additional weeks or a total of 24 weeks. Five hundred brook trout were used in each group at the beginning. At the end of 16 weeks this number was reduced to 300 in order to prevent crowding in the troughs. As far as these growth curves indicate these practical diets are equal in value. Either peanut meal or cottonseed meal are suitable trout feeds if combined with a binder such as dry skim milk. The percent utilization of such feeds, however, cannot be determined until balance experiments can be run.

During the past year standard fish hatchery troughs were used for running another series of studies upon commercial feedstuffs that had already been tested in previous years. Experimental diets were composed of varying proportions of dried skim milk, cottonseed meal, white-fish meal, salmon-egg meal, and raw beef liver. Each experimental group was started with 1,250 fingerling brook trout of the Pittsford (Vt.) strain and continued for 28 weeks.

The poorest growth was made by a group fed on a diet of beef liver alone. The best growth was obtained from the group fed on a diet composed of equal parts of cottonseed meal, skim milk, and salmon-egg meal, supplemented with 15 percent of fresh liver. White-fish meal can be substituted for the cottonseed meal and will produce similar results, both as regards growth and economy. Since the best growth resulted from the diet containing 15 percent fresh beef liver, this combination seems adequate for a period of at least 6 months.

In analyzing the results of these experiments with commercial feed combinations, the efficiency of conversion has been calculated to show the number of grams of feed required to produce 1 gram gain in weight of trout during the 4-month period, and also the cost of feed required to produce 1 pound of trout. It is furthermore of interest to compare the ability of different trout species to convert feedstuffs to body tissues, especially where there is a constant water temperature.

Analysis of the results shows that the dry feed required to produce 1 unit by weight of trout ranged from an average of 2.69 units, using a diet of skim milk, cottonseed meal, and raw beef liver, 1:1:2, to as high as 5.35 units, on a diet of skim milk, 29 percent; cottonseed meal, 28 percent; raw beef liver, 15 percent; and white-fish meal, 28 percent. The trout are somewhat more efficient than these figures show, however, because the losses of feedstuffs in the water are calculated as feed consumed.

In these studies the mean value for food conversion among the different species of trout are: Lake, 3.06; rainbow, 3.47; brook, 4.73; and brown, 5.14. These results to date indicate that the species that is most efficient food conversion in water with a temperature of about 47° F. is the lake trout, while the least efficient is the brown trout.

Experiments were undertaken to develop a biological method of assaying the potency of various growth factors in prepared food materials. In vitamin assay experiments with rats, it is a common practice to deplete their stores of a given vitamin until they cease to grow. At this point the substance to be assayed for its vitamin potency is fed at various levels to the animals that have been depleted. The growth response serves to measure the potency of the vitamin preparation. Attempts were made to establish such assay methods with trout, but thus far no standard procedure has been developed. We have no knowledge of the relative requirements of fish for vitamins compared to the higher animals.

Two lots of experimental fish, which showed the usual marks of failure upon totally dried diets, were changed to a diet of dry skim milk, supplemented with fresh liver, preserved in 5 percent by weight of calcium hypochlorite. Upon this new diet the growth rate became normal and the mortality rate declined, indicating that trout can ingest meat preserved in hypochlorite without apparent injury.

Another lot fed on a dry diet until the growth rate had fallen and mortality sharply increased was transferred to a diet of dried skim milk, supplemented with one-twentieth of its weight of liver dried in a current of nitrogen. The growth and mortality curves confirm earlier findings that liver will retain some of its potency in factor H if dried at a low temperature in inert gas. Such experiments represent relatively crude assays but they provide the foundation for improved ones.

After the first experiments with trout feeding, a requirement for specific substances similar to vitamins was recognized by Dr. McCay. This vitamin requirement could not be stated in terms of recognized accessory factors since it was very sensitive to heating and was destroyed when food products were dried at the usual high temperatures in contact with air.

In the course of the past 3 years, it has been discovered that this vitamin termed factor H is partially preserved by drying at low temperatures in contact with an inert gas. Since the determination of the requirements of trout for the recognized vitamins is very difficult until more is learned concerning the nature of factor H, efforts have been continued to prepare a concentrated extract containing this growth factor.

Two methods of testing have been employed. One consists in feeding trout on a purified mixture of casein, a starch-dextrin, yeast, cod-liver oil, and salt mixture, plus the supplement to supply factor H. Yeast and cod-liver oil have been used simply because it is very likely that all higher animals require some of the factors contained in yeast as well as some of the fat soluble vitamins.

Up to the present time only alcoholic extracts of beef lungs and liver have been prepared. Careful methods have been employed in order to preserve the accessory growth factor. Dried beef liver, evaporated in vacue under inert gas, was prepared as a control.

From a number of assays it was found that 15 percent of raw liver was an adequate supplement for an otherwise complete diet, furnishing a sufficient supply of factor H. Hence, the present experiments were started with a 5 percent supplement on concentrated products, but growth and mortality curves show that this level was too low. At the end of about 2 months the supplement was increased to 15 percent. Nevertheless, growth curves indicate that much of the original growth factor was lost even in the vacuum dried liver. It also indicated that a considerable fraction of factor H is held in the alcoholic extract. The lung residue is almost totally lacking in this factor, while the liver residue still retains some potency.

A second series of assays were undertaken, testing the efficiency of autolyzed liver products as supplements for a synthetic diet deficient in factor H, in the hopes of finding a liquid liver with a high degree of potency. These data indicate that raw egg and liver extract, plus residue, have considerable amounts of factor H, but they do not clearly establish that autolysis destroys factor H because the material used as a preservative in the course of autolysis may have influenced the results.

LIMNOLOGICAL INVESTIGATIONS IN THE ROCKY MOUNTAIN REGION IN THE INTEREST OF FISH STOCKING

Because of the severe curtailment of the Bureau's appropriations, investigations in the national parks and forests under the direction of Dr. A. S. Hazzard were omitted during 1933, and a program of field work which entailed minor expenditures was substituted. However, lessened field activities afforded opportunity for study of data previously obtained and made possible the preparation of several papers for publication.

QUANTITATIVE FOOD STUDIES IN MOUNTAIN STREAMS

Numerous samples of bottom organisms were taken from square-foot units of bottom in four mountain trout streams in the vicinity of Salt Lake City, using methods developed by Dr. Needham, of the Bureau's staff. The purpose of these studies was threefold: to determine the variation in food supply at different elevations in the same stream and in different streams; to study the fluctuation in numbers and weight of bottom organisms in three streams during the months of July, August, and September; and to secure some information as to the relative productivity of trout streams in this region as compared with those studied in other parts of the country.

Fifty-three square-foot samples, taken in the riffle areas where the bottom consisted of gravel and small rubble, showed great variation both as to numbers and total weight of organisms in different streams. Since other environmental conditions were similar, higher temperature was considered responsible in certain waters for the production of greater variety and quantity of food. Caddis flies and may flies were found to be dominant organisms in these mountain streams.

Samples taken at elevations from 4,400 to 7,500 feet on one stream and from 5,700 to 7,000 feet on another showed no appreciable difference in weight over the average for each stream.

The studies also indicated that the food supply for any stream is not constant for the summer months. In one stream a rise in weight of samples occurred in August, followed by a decline nearly to the July level in September. In another an increase in weight was noted throughout the summer. In the third, a marked decrease in the average weight of samples occurred in each successive month. On the other hand, all three streams showed a marked increase in the number of organisms in August, followed by a decrease in September, which, however, did not reach the July level. This indicates that August is probably the best month for planting small trout in our mountain streams as the smaller organisms are most numerous then.

The average wet weight of the 53 samples was found to be 1.18 grams, although the average for the 3 streams studied monthly was 1.69. These averages compare very closely with those for trout streams of New York and California having a similar type of bottom.

The results of this investigation were presented at the fall meeting of the Utah Academy of Sciences and will appear in abstract form in the proceedings of this society for 1933.

COOPERATIVE INVESTIGATIONS

Through the cooperation of the Utah Fish and Game Department in defraying field expenses and furnishing assistance, limnological studies were made of three important fishing waters for the purpose of developing better plans for regulation and planting. The Division of Fish Culture of the Bureau also made possible a study of Bear Lake, Utah.

Fish Lake.—Inasmuch as this is probably the most productive trout lake for its size in the country, the privilege of making a limnological study here was welcomed not only as an opportunity to assist the State in its planting policies there, but also to seek to determine the reason for its phenomenal productivity. Since accurate information as to what constitutes a good trout lake is scarce, additional information is of great value in judging the carrying capacity of other waters and in seeking means to improve them.

The usual procedure for the study of lakes was followed except that more complete data were taken than is usually possible during a preliminary survey. One hundred forty soundings were made as a basis for the construction of a reasonably accurate contour map. Temperatures were taken at frequent intervals from surface to bottom in various parts of the lake. Chemical analyses for dissolved oxygen, free carbon dioxide, carbonates, bicarbonates and pH were made at a number of stations and on the principal tributaries. Transparency was measured by the Secchi disk. Numerous samples of plankton and bottom foods in the benthic and littoral zónes were secured. The type of bottom and areas of vegetation were recorded on the large scale map. Three 1-hour gill net sets were made and a number of fish taken by anglers were secured for scale samples, weight-length data, and stomach analysis. The tributary streams were also examined in order to determine their relation to the lake's productivity. A record of the planting and fishing history is being compiled by a member of the State Department. When the study of the data is complete, a joint paper will be prepared covering this investigation. It is believed that valuable information will result from this study.

Strawberry Reservoir.—A marked decline in the fishing in this lake resulted in the request for a study to determine the cause and possible remedies. This investigation was begun in May, just before the break-up of the ice. At that time it was impossible to study conditions except at one point. Samples of the bottom water indicated a marked deficiency in oxygen which, if typical of the lake, might account for reported winter losses. Plans are made to obtain sufficient samples in February 1935 to determine the severity and extent of this deficiency.

Sets with the graded size gill net, the approximate efficiency of which has been determined, indicated an extreme scarcity of trout in June of this year. This, together with the small run of spawning fish, led to an order by the State Fish and Game Commission closing the reservoir and its tributaries to fishing in order to conserve the remaining stock of native cutthroat trout.

Samples of the plankton and bottom organisms in June and in August indicated a great abundance of both of these foods but a scarcity of shore forms, the latter being caused by severe fluctuation in water level. Stomach examination of trout and chubs (Tigoma) showed them to be direct competitors. The studies of June and August showed an abundance of oxygen to be present everywhere in the bottom waters. Apparently no summer deficiency occurs here, probably because of shallow water, exposed location and frequent heavy winds. Temperatures were found to be suitable everywhere, probably caused by high altitude and cold nights. Since all other conditions appear to be favorable, the explanation may be found in winter oxygen deficiency.

Scofield Reservoir.—Reports of poor catches at this lake, together with rumors of heavy winter losses, resulted in a request by the department for this study. Sets with the graded size gill net indicated a reasonable abundance of trout in a portion of the reservoir and thereby reassured guides and fishermen in that locality. Subsequent improvement in the catches confirmed our findings. Food samples showed a fair amount of plankton and bottom forms. Oxygen determinations during August at 6 scattered stations indicated a marked deficiency over about half of the area in spite of the fact that a maximum depth of only 21 feet was found. This indicates that there may be a decided winter deficiency which would cause a considerable loss of trout. Recommendations that heavy plantings here be avoided and that a study of winter oxygen conditions be made are being followed.

Bear Lake.—At the request of the Bureau's Division of Fish Culture, a study of Bear Lake, Utah-Idaho, was made possible by the defrayment of expenses by that division.

Chemical analyses made during a former study by the Bureau, and confirmed in part by this investigation, show an abundance of oxygen at all depths. The water is highly alkaline and, according to previous studies, contains considerable zinc. Temperatures were found to be entirely suitable for trout. A study of the food supply, however, indicated a decided deficiency. Plankton was found to be scarce. The Bureau's earlier workers also remarked the scarcity of phytoplankton and suggested that the high zinc content might be a cause. Bottom samples were poor in both the deeps and the shallows, the sand beaches being almost devoid of life. Limited areas of gravel and rocky shore supported a goodly number of organisms, including shrimp. Aquatic vegetation appeared to be limited to a few small patches of Potamogeton. Permanent lowering of the lake level by power development has resulted in a littoral zone composed almost entirely of sand, leaving stranded the original gravel and cobble beaches. This has undoubtedly eliminated a rich productive area and thereby decreased the lake's food supply. Sets with the graded size gill net indicated a scarcity of fish.

Observations following several plantings of fingerling trout and salmon indicated that heavy losses may be sustained due to the depredations of gulls, chub (Tigoma), and adult trout. A period of approximately 48 hours seems necessary for young trout and salmon to lose their conspicuous dark color and to acquire the strength and agility necessary to escape their enemies. Experiments in adaptation will be conducted by the Division of Fish Culture at this lake during the coming season in an attempt to overcome this loss in planting.

MUSSEL INVESTIGATIONS AND POLLUTION STUDIES IN INTERIOR WATERS

The various activities carried on by the staff under the direction of Dr. M. M. Ellis with headquarters and laboratories furnished by the

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University of Missouri have been grouped under the two headings, mussel investigations and pollution studies. Attempts at artificial propagation of mussels have led to a study of the effects upon aquatic life of stream pollution by industrial wastes although these effects are by no means confined to mussels but extend to the food and game fishes as well.

FRESH-WATER MUSSEL INVESTIGATIONS

Mussel propagation experiments.—The raising of large numbers of fresh-water mussels in limited areas and with a limited water supply, which is being done successfully in the Fort Worth raceway experiments, presents a series of problems concerning which little or no data exist. Hence, a program of investigations was undertaken over a year ago looking ultimately to the solution of the practical problems of mussel farming. During the past year much progress has been made in this work. To date the findings may be summarized as follows:

Physical and chemical environment data.—A very complete set of data on the chemical and physical features of the environment suitable for the growth of fresh-water mussels has been obtained, including continuous daily records of temperature, dissolved gases, relative acidity, lime content, and other factors, for a period of over 14 months. These data have demonstrated that the calcium content of the water can be controlled and a calcium level suitable for proper shell growth readily maintained by the simple expedient of splashing the intake water through piles of limestone rubble, as was done in these experiments. From these records and analyses a set of normals has been established against which conditions in other experiments or even in other localities can be checked.

Bottom survival.—Commercially it is desirable that as large if not larger mussel populations be maintained on a given area of bottom in artificial raceways as would be found in natural waters. However, in the raceway the volume of water available is much less than in a natural river or stream. To determine, therefore, the balance between numbers of mussels per unit of bottom and amount of water flow, experiments on this phase of the raceway problems were undertaken. These experiments have yielded very definite results and have made progress to the next development possible.

The maintenance of proper bottom conditions for mussels in artificial raceways requires the constant flow of a large volume of water, so directed that the current will scour the bottom free of silt deposits.

Deposition of even so small a layer of silt as one-quarter of an inch in thickness, over the bottom of the raceway soon killed out even the adults of most species of fresh-water mussels. The harmful effects of erosion silt were greatly increased by particles of decomposing algae and other organic matter which in the undisturbed silt deposits, created a high oxygen demand. These findings on erosion silt and organic wastes confirm our previous statements, based on field work in natural waters, concerning the elimination of mussel beds in natural streams by silt deposits.

The volume of water required for the power scouring of raceway bottoms would be too large and too expensive to be practical under most conditions of mussel farming, if large numbers of mussels are to be handled in small areas and all of the available space utilized.

In the bottom survival experiments the yellow sandshell was found to be the least resistant to silting in, and the river mucket from Indiana, the most resistant, of the better commercial species. The best survival (considering the heavy-shelled species) against the unfavorable conditions brought about by silt deposit was made by the maple-leaf shell.

Mussel crate experiments.—From the results of the bottom survival experiments it was evident that in view of the average volume of water available for such raceways, it was not feasible to raise mussels in large enough numbers on the bottom to make the project commercially practical, especially with the silt hazard always an uncertain variable. With a view to eliminating the bottom silt hazard and also to increasing the actual number of mussels held in any raceway to a commercially desirable figure, crates in which mussels are now being raised, were devised for the raceways In these crates the mussels are relatively free from any sort of mud or silt hazard and as the trays of the crates are in tiers, from 3 to 10 times as many mussels are now being carried in a single crate as could be raised in the same bottom space as that supporting the crate. This advantage is gained too without any increase in the amount of water used. During 4 months of trial, the crates, of which we now have 3 types, are proving very successful, and the survival of the mussels in the crates has been excellent even though the animals are being crowded intentionally to determine the maximum number a given volume of water will support, both with and without artificial feeding. The effects of light penetration through the water on the animals in the top trays, the spread of mites, and the growth of algae on the trays are being followed simultaneously with the main experiment, and at present over 10,000 mussels are being carried in one series of crates alone in species survival, breeding stock, and age-class tests.

Physiological and biochemical studies of mussels.—In order to determine the success of various tests in the Fort Worth raceway project, as well as the condition of the mussels themselves, several lines of physiological and biochemical studies on mussels have been followed of necessity at the Columbia laboratories.

Food and food storage.—The feeding experiments have been continued at Columbia. The ability of mussels to utilize various types of cheap material as food was determined by biochemical analyses of the stored food. The relation of this stored food to survival and to the body condition of the mussel has just been checked in a series of experiments running over some 18 months. It was found that the yellow sandshell could survive complete starvation for 10 to 18 months before the reserve food supply was seriously depleted, if the animal were well fed to start with. The mussel seems to be an irregular feeder, storing large quantities of reserve food when food is abundant and easily available.

Reproduction.—So little is known concerning the breeding habits of most of the species of fresh-water mussels that various difficulties have been encountered in obtaining breeding stock for propagation and in selecting lines from which to raise mussels. Both at Columbia and Fort Worth test series are being held for reproduction studies, and attention is given to this phase of the work in the field.

The spawning habits of the Arkansas fanshell have been definitely determined and confirmed by observations in three different years by Thomas K. Chamberlain. In the field studies the formation of winter colonies has been discovered and significant observations on the method of fertilization obtained. Over 400 marked individual mussels have been collected from such colonies for study.

Internal and external activities as indices of condition.—The studies at Columbia of the mussel heart by H. L. Motley have provided normals with which the condition of mussels in the various experiments is readily compared. This heart test has also proved very helpful in field examinations as well as in the laboratory studies, and new information concerning the successful shipment of mussels has been one of the advances made through the application of these heart data. By slowing the heart action with cold, dry air (5°–10° C.) it was found that the metabolism of the animals could be reduced to almost the hibernation level. Applying this fact, living mussels have been kept out of water in dry air for over 80 days, and have remained in good condition throughout the tests, thus indicating a new safe method for the shipment of mussels over long distances and with no care on the part of the carrier. The survival in shipment tests has been practically 100 percent.

The observations on mussel activities under normal and adverse conditions have been greatly extended and are now being revised for publication.

POLLUTION STUDIES

Erosion silt.—The review of the mass data on erosion silt and its bearing on fisheries problems has been completed and the scientific results organized for publication. Particular attention has been given to the effects of erosion silt on light transmission, conductivity, water temperature, and salt content, as bearing on fisheries problems.

Arsenic investigations near Gardiner, Mont.—The study of arsenic pollution in Bear Creek, a tributary of the Yellowstone River near Gardiner, Mont., was made with reference to stream pollution and to possible storage of arsenic by certain aquatic insects which are eaten by the trout and whitefish. These investigations were particularly important to the program of pollution in that they pointed to an unlooked for source of storage which must be considered in future studies of other heavy metals as well as arsenic.

Cooperative projects with United States engineers.—The cooperative work with the United States engineers has been continued during the year. Plans are now being made for a continuation of these projects as requested by the office of the Chief of Engineers. This work consists in the investigation of stream conditions with reference to erosion and pollution and supplies much information on our inland waters.

New method for studying pollution effects.—As a result of difficulties encountered in previous studies of pollution problems and in view of the various discrepancies between existing observations on pollution and relative toxicity of pollution agents, experiments have been in progress for some time looking to the development of more satisfactory methods of study and to the standardization of results. New apparatus has been devised and new technique perfected which will be used in further pollution studies. These new methods involve the use of standard strains of plankton animals raised under controlled environments and tested under uniform conditions of temperature, light, etc., which can be repeated time after time with extreme accuracy. Both immediate and cumulative effects can be studied by this method. The findings in the plankton tests are verified on standardized fish preparations and on standardized free living fish, both in the laboratory and under controlled conditions out of doors. The new plan offers scientific data on pollution and pollution problems which were not obtainable by the other methods of study. Already the method has been applied to the investigation of heavy metal pollution, industrial wastes, and municipal wastes with excellent results in each case. A general standardization of pollution measurements is to be produced as rapidly as the work will permit.

In connection with the development of standard procedure for the maintenance of standard strains of plankton, the work required the reinvestigation of basic food for plankton, and it was found that this could be derived from several elements of waste now lost in general sewage disposal. Investigations of these various food constituents are now under way and one new combination for plankton food is in press from this work.

INDEPENDENT ACTIVITIES OF THE FISHERIES BIOLOGICAL LABORATORIES

The Bureau owns and operates four Fisheries biological laboratories located respectively at Woods Hole, Mass.; Beaufort, N.C.; Fairport, Iowa; and Seattle, Wash.

The Woods Hole laboratory, provided with running salt water, a reference library, and the usual biological, chemical, and photographic laboratories and stock rooms, normally offers alcoves or tables for the free use of independent investigators engaged in research in marine biology. A marine fish hatchery is operated in conjunction during the winter, and a small public aquarium is maintained during the summer season. A 40-foot diesel-powered vessel, equipped for trawling, tow net, and hydrographic work, and smaller launches and rowboats are attached to the station.

The Beaufort (N.C.) laboratory has no public aquarium nor as extensive a library as at the Woods Hole station, but has running salt water and similar laboratory facilities and floating equipment. Owing to the mild climate and the terrapin hatching activities, the station is operated the year around and offers research facilities to private investigators.

Research activities at the Fairport (Iowa) laboratory, equipped for the investigation of fresh-water biology, have been entirely discontinued, owing chiefly to a lack of sufficient funds. The station is operated for the present by the Division of Fish Culture solely for the culture of warm-water pond fishes.

The Bureau's newest laboratory at Seattle, Wash., serves as headquarters for the Division's Pacific coast and Alaska research staff, whose activities are reported elsewhere, for the technologists and statistical agents of the Division of Fishery Industries, and for the staff of the International Fisheries Commission, United States and Canada. Although, except for a chemical laboratory, the building is not equipped for experimental biological research, complete plumbing was installed in most of the rooms when the building was constructed so that it can be adapted readily for experimentation in the future should fishery investigations in that region develop so as to require such equipment. Hence no facilities are available for guest investigators.

WOODS HOLE LABORATORY

During the summer of 1933 experiments on the physiology of the oyster were continued by Dr. P. S. Galtsoff and R. O. Smith and experiments on methods of marking mackerel were carried on by O. E. Sette at the Woods Hole Biological Station. Continued lack of necessary operating funds prevented other work at this station.

This is the second summer that this well-equipped marine laboratory, capable of providing facilities for some 20 investigators, has been largely unused. In the meantime, problems of importance to the development of fisheries biology, whose solution would greatly facilitate progress in the major investigations on the condition of our fisheries, are rapidly accumulating. Among these are: (1) The effect of temperature and food on the rate of growth of certain food fishes; (2) the effect of group behavior on activity and rate of growth; (3) the physiological effects on the fish of injuries received in tagging operations; (4) the effect of temperature on calcium metabolism and consequent alteration of scale structure; (5) the factors responsible for high mortality in the larval stages of fishes; (6) the effects of temperature on the respiratory mechanism of mackerel. These and many other problems might readily be attacked at very little expense to the Government by volunteer investigators from universities if they could be provided the facilities. Hence resumption of normal activities at the Woods Hole laboratory is urgent.

BEAUFORT LABORATORY

Research.—Operation of the Beaufort laboratory was continued throughout the year under the direction of Dr. H. F. Prytherch and furnished facilities for the study of fishery problems of the South Atlantic and Gulf region. The chief investigations conducted here at present by the Bureau's staff are reported elsewhere. Laboratory facilities for marine research have been furnished to 13 independent research workers from other institutions who have engaged for short periods of time in the following studies: Dr. H. V. Wilson, University of North Carolina, behavior of living cells of Polyzoa; Irene Bolick, University of North Carolina, lymph cells of Echinoderms; W. H. Hadley, Jr., Cornell University, the foraminifera of the North Carolina coast; H. C. Burdick, State University of Iowa, metabolism of fish; Dr. Bert Cunningham, Duke University, relation of temperature to rate of development of terrapin embryos; Dr. P. B. Powers, University of Pennsylvania, ciliate Protozoa of Echinoderms; F. R. Brown, Vanderbilt Medical School, spermatozoa of Prosobranch snails; L. Lyndon Williams, Rensselaer Polytechnic Institute, distribution of marine invertebrates in the vicinity of Beaufort; Dr. Hoyt S. Hopkins, New York University, respiration and tissue-glycolysis in bivalve mollusks; Earl Mathis, Northwestern

University, susceptibility of fish to tubercular bacilli; Dr. Duncan S. Johnson, Johns Hopkins University, the ecology of vegetation of Bogue and Shackleford Banks; Donald B. Lawrence, Johns Hopkins University, effect of sand dunes movements on flora of Shackleford Banks; Edward D. DeLancaster, Johns Hopkins University, blue-green algae of the Beaufort region.

The facilities of the station were also utilized by the United States Chemical Warfare Service for tests of wood preservatives and by the Bureau's Division of Fishery Industries for experiments on the durability of net twines treated with different preservatives. Cooperative tests were made with the Woolsey Paint Co. in respect to the anti-fouling and protective value of copper paints; with the Tropical Paint & Oil Co. on the suitability of Bakelite varnish for marine use; and with the Union Carbide & Carbon Corporation to determine the value of different grades of stainless steel and other steel alloys for the prevention of fouling of ship bottoms.

Terrapin culture.—The propagation of diamond-back terrapin was continued at the Beaufort laboratory in cooperation with the Division of Fish Culture and yielded in 1933 a total production of 10,060 young terrapins, which is next to the highest record obtained thus far in the culture of this species. For the first time the distribution of young terrapins has been extended so as to include the waters of Florida, South Carolina, and North Carolina.

In cooperation with the Florida Department of Conservation 2,000 terrapins were planted on May 12, in selected marshes and protected areas in the Choctawhatchee Bay region. In South Carolina a similar planting was made on April 27, in the vicinity of Charleston in cooperation with the State Board of Fisheries. A somewhat greater distribution of young terrapins amounting to 5,730 was made in North Carolina in cooperation with the Department of Conservation, because of the scarcity of terrapins in these waters and in appreciation of the continued support received from this State in propagation of this species. The remaining 330 terrapins have been saved for breeding purposes and for the continuation of the experimental studies conducted by Dr. George T. Hargitt and Dr. Bert Cunningham, of Duke University.

Over 93½ percent of the original hatch of 10,574 were successfully reared to the age of 9 months at the Beaufort laboratory before liberation. It is believed that these operations establish the highest survival record yet obtained in the culture of fresh water and marine animals where the young of a species are reared over a period of several months. The output of the Beaufort station hatchery since 1930 has been as follows: 1930, 5,778; 1931, 5,500; 1932, 11,086; and 1933, 10,060. During the summer of 1933 a new brood of 10,624 young terrapins was obtained. These terrapins are now being fed for a short period in the fall and are then placed out of doors in protected hibernating pens in order to reduce the cost and labor of their care and feeding as required previously when they were kept during the winter in the heated rearing house. Distribution of the 1933 brood will be made during the following spring throughout the South Atlantic States in cooperation with the various State departments.

APPROPRIATIONS

The work of the Division of Scientific Inquiry during 1933 was supported chiefly by the appropriation "Inquiry respecting food fishes", of which approximately one-half was available from the last half of the fiscal year ending June 30, 1933, and half from the appropriation ending June 30, 1934. The amount appropriated under this heading for the fiscal year 1933 amounted to $200,000, but owing to administrative deductions under the Economy Act and by official order the amount available for expenditure was only $178,001. During the fiscal year 1934, $173,000 was appropriated under the same heading, but of this amount only $122,033 was available for expenditure. The appropriation for 1934 is therefore a reduction of 31.4 percent from the funds available for 1933, which in turn was a reduction of 31 percent from the amount appropriated in the previous year. A summary of the amounts available for the various major projects follows.

Projects	1933	1934
Commercial fishery investigations	$92, 711	$65, 855
Oyster cultural investigations	32, 552	22, 932
Aquicultural investigations	39, 538	30, 506
Conserving fish by screens and ladders	5, 491	250
Washington Laboratory and administration	7, 719	2, 500
Total	178, 001	122, 033
Allotment for maintenance and operation of vessels	14, 000	10, 000

This reduction in appropriation has resulted not only in the serious curtailment of field work in connection with all of the projects and legislative reductions in salary, as well as the assignment of administrative furlough to all the investigators, but has required the dismissal of a number of the Division's regular staff. The most serious aspect of this reduction in personnel lies in the diversion of skill, experience, and technical training from fishery research into other fields rather than in the increase of unemployment thereby. This is a loss which will have a lasting effect upon the development of fishery science and aquiculture for men with adequate fundamental training and sufficient practical experience to conduct productive studies in these fields are extremely limited in number. Since few universities offer adequate training in these lines, the rebuilding of a scientific staff in the future will be correspondingly retarded.

Two of the Bureau's biological laboratories have been closed, and, as noted elsewhere, the vessel facilities have been severely curtailed by the loss of the *Albatross II*, which was laid up during the fiscal year 1932 and decommissioned on July 1 of that year, thus leaving the Bureau with no means whatever of conducting certain essential types of investigations on the fishing grounds where the most important marine fisheries of the United States are prosecuted.

With the complete expenditure of funds allotted by the Public Works Administration during the coming fiscal year, certain projects of great value to the fishery resources of the country that have gotten well under way will have to be abandoned for lack of regular appropriations for their continuation. One of these projects is the investigation of stream pollution and means of neutralizing or properly utilizing waste materials now rendering large portions of our streams unfit for aquatic life.

With the construction of dams on the Columbia River, the salmon runs of that watershed will be seriously menaced. Continued observations on the effectiveness of fish protective works at the Bonneville Dam will be required after the expenditure of the Public Works allotment, and these studies must be coordinated with similar studies at other dams now built or under construction. This work should be carried on for at least a 10-year period by regular annual appropriations.

With Public Works funds, a favorable beginning will have been made in planning a rational stocking policy for the waters of the public domain included in the national forests. Less than one-sixth of the total forest area can be covered, however, with the allotment during the coming year and, forming as it does the very foundation of fishery conservation in interior waters, should be continued on the present scale until the entire area of the national forests has been covered. This work likewise should be supported by annual appropriations commensurate with the importance of the undertaking.

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PROPAGATION AND DISTRIBUTION OF FOOD FISHES, FISCAL YEAR 1934[1]

By GLEN C. LEACH, *Chief*, and M. C. JAMES, *Assistant Chief, Division of Fish Culture*

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INTRODUCTION

The fiscal year 1934 has seen some important changes in the activities of the Federal fish-cultural establishment. The period has been marked by a definite curtailment in the scope of propagation activities, contrasted with the development of physical equipment to a high state of efficiency. The latter objective was accomplished by the utilization of unemployment relief, funds, and labor for the repair and reconditioning of older stations, and a continuation of the development of newer hatcheries. The Federal hatcheries are now in condition to produce the largest output of fish in their history whenever increased funds for actual operations may be available.

In line with the Administration's policy in devoting greater attention to the conservation of interior resources by such means as reforestation, conservation of water, and protection of migratory water fowl, the Bureau has concentrated upon the propagation of game fishes. These forms are subject to a more immediate possibility of

[1] Appendix IV to the Report, Commissioner of Fisheries, 1934. Approved for publication, Jan. 18, 1935.

depletion or extermination, and are of a direct interest to a larger number of people than are the commercial varieties. The latter are, as a whole, more capable of maintaining their numbers by natural replenishment. A need more clearly evident and benefits to a maximum number of people were the justification for this modification of previous policy.

A bald statistical and tabular summary of the year's activities falls far short of presenting a true picture of the real nature of this work. It is unlike the routine governmental function in that it calls for cooperation with and assistance to nature. Much of the work is actually conducted in the isolated wilderness and it requires resourcefulness, ingenuity, and hardiness on the part of the personnel. The following data will reveal what was accomplished by the Division of Fish Culture in 1934, but the ultimate outcome and value of the work will rest in the success or failure of anglers and commercial fishermen several years hence.

SPECIES PROPAGATED

Four species which appeared in last year's records were not propagated during 1934. Three of these, glut herring, cisco or lake herring, and pollock, are commercial forms. No Dolly Varden trout, a western trout for which there is little demand, were handled. The 42 principal varieties which were distributed include the most important game fishes and a number of the commercial species which are most amenable to artificial propagation. While minnows, shiners, and bait fish are propagated as forage forms at the hatcheries, they are not available for distribution. The following summary shows the common and scientific designation of the species produced.

CATFISHES (SILURIDAE):
- Catfish (*Leptops olivaris*).
- Spotted catfish (*Ictalurus punctatus*).
- Horned pout (*Ameiurus nebulosus*).

CARP (CYPRINIDAE): Common carp (*Cyprinus carpio*).

BUFFALOFISH (CATOSTOMIDAE): Common buffalo (Ictiobus sp.)

SHAD AND HERRING (CLUPEIDAE):
- Shad (*Alosa sapidissima*).

SALMONS, TROUTS, AND WHITEFISHES (SALMONIDAE):
- Common whitefish (*Coregonus clupeaformis*).
- Chinook, king, or quinnat salmon (*Oncorhynchus tschawytscha*).
- Chum salmon (*Oncorhynchus keta*).
- Pink or humpback salmon (*Oncorhynchus gorbuscha*).
- Coho salmon, silver salmon (*Oncorhynchus kisutch*).
- Red salmon, sockeye, or blueback salmon (*Oncorhynchus nerka*).
- Steelhead salmon (*Salmo gairdneri*).
- Atlantic salmon (*Salmo salar*).
- Landlocked salmon (*Salmo sebago*).
- Rainbow trout (*Salmo shasta*).
- Black-spotted trout, redthroat trout (*Salmo lewisi*).
- Loch Leven trout (*Salmo levenensis*).
- Lake trout, Mackinaw trout (*Cristivomer namaycush*).
- Brook trout (*Salvelinus fontinalis*).

GRAYLINGS (THYMALLIDAE): Montana grayling (*Thymallus montanus*).

PIKES (ESOCIDAE): Pike and pickerel (Esox sp.)

SUNFISHES (CENTRARCHIDAE):
- Crappie (*Pomoxis annularis* and *P. sparoides*).
- Largemouth black bass (*Micropterus salmoides*).
- Smallmouth black bass (*Micropterus dolomieu*).
- Rock bass (*Ambloplites rupestris*).
- Warmouth bass, goggle-eye (*Chaenobryttus gulosus*).
- Bluegill sunfish (*Lepomis incisor*).

SUNFISHES (CENTRARCHIDAE)—Continued.
- Green sunfish (*Lepomis cyanellus*).
- Redbreasted bream (*Lepomis auritus*).
- Red-eared sunfish (*Lepomis heros*).
- Common sunfish (*Lepomis gibbosus*).
- Rio Grande perch (*Herichthys cyanoguttatus*).

PERCHES (PERCIDAE):
- Pike perch (*Stizostedion vitreum*).
- Yellow perch, ringed perch (*Perca flavescens*).

WHITE BASSES (SERRANIDAE):
- White bass (*Roccus chrysops*).
- White perch (*Morone americana*).

DRUMS (SCIAENIDAE): Fresh-water drum, lake sheepshead (*Aplodinotus grunniens*).

CODS (GADIDAE):
- Cod (*Gadus callarias*).
- Haddock (*Melanogrammus aeglefinus*).

FLOUNDERS (PLEURONECTIDAE): Winter flounder, American flatfish.

MACKERAL (SCOMBRIDAE): Common mackerel (*Scomber scombrus*).

Summary, by species, of the output of fish and fish eggs during fiscal year ending June 30, 1934

Species	Eggs	Fry	Fingerlings	Total
Catfish		5,000	5,149,400	5,154,400
Buffalofish [1]	7,726,000	5,000	85,000	7,815,000
Carp [1]	6,250,000	290,000	1,330,000	7,870,000
Shad		11,574,000		11,574,000
Whitefish	60,000	9,290,000		9,350,000
Chinook salmon	6,025,000	759,000	19,124,600	25,908,600
Chum salmon		11,621,000	236,500	11,857,500
Silver salmon		1,430,000	1,103,000	2,533,000
Sockeye salmon		5,450,000	18,144,100	23,594,100
Humpback salmon		139,000		139,000
Steelhead salmon	110,000	73,000	2,198,500	2,381,500
Atlantic salmon			20,900	20,900
Landlocked salmon			474,100	474,100
Rainbow trout	6,695,000		12,538,600	19,233,600
Blackspotted trout	18,165,000		16,294,700	34,459,700
Loch Leven trout	13,174,000	7,726,000	5,526,400	26,426,400
Lake trout	500,000	786,000	383,400	1,669,400
Brook trout	5,654,000	3,597,000	20,440,700	29,691,700
Grayling	290,000	4,950,000		5,240,000
Pike and pickerel			72,900	72,900
Mackerel		2,946,000		2,946,000
Crappie			9,528,300	9,528,300
Largemouth black bass		510,000	4,304,200	4,814,200
Smallmouth black bass		931,000	334,800	1,265,800
Rock bass			84,900	84,900
Warmouth bass			14,500	11,500
Sunfish			3,951,000	3,951,000
Pike perch	830,025,000	6,600,000		836,625,000
Yellow perch		4,000,000	2,191,800	6,191,800
White perch		900,000		900,000
White bass			18,900	18,900
Rio Grande perch			8,800	8,800
Fresh-water drum			6,600	6,600
Cod	1,037,262,000			1,037,262,000
Haddock	191,754,000			191,754,000
Winter flounder	46,077,000	888,415,000		934,492,000
Miscellaneous fishes			2,801,600	2,801,600
Total	2,169,766,000	961,997,000	126,368,200	3,258,131,200

[1] All carp and buffalofish shown in above table are planted in commercial areas of the Mississippi River.

PRODUCTION

A reduction approaching 40 percent in the amount of funds available for hatchery operations was reflected by a great drop in the output of fish and eggs. The production of 3,258,131,200 was less than half of the previous year's record which showed 7,202,155,625. The necessity for economy was met by the outright cessation of operations at 9 hatcheries, and a definite curtailment of propagation and distribution activities at the majority of the remaining establishments. The bulk of the reduction in output applied to commercial species. There was an actual increase, however, in the output of 10 of the most important species of game fish. The production of these forms amounting to 135,211,900, represents 4.1 percent of the total or twice the ratio of the 1933 figures. The actual number of all species of game fish distributed was slightly below the previous year's owing to a recession in some of the minor forms such as sunfish, crappie, and pickerel. The fact remains that the forms for which the greatest demand exists were available in larger numbers.

There was a reduction in the number of fingerlings and larger fish reared at the hatcheries. The drop of approximately 42,000,000 is largely traceable to the curtailment of operations with Pacific salmon, large numbers of which are reared to fingerlings, and to restrictions on the rescue work in the Mississippi area. The latter activity produces larger fish entirely and the total output of this class fluctuates according to the scope of the work. As far as the important trout and bass were concerned, however, the fingerling production surpassed that for 1933. Discussion of the 1934 production of fish and eggs can be summarized by the statement that the results will fluctuate according to the facilities and funds devoted to the enterprise, and within certain limits can be expanded or reduced at will. Unit costs are sufficiently constant to justify this view of the matter.

CONSTRUCTION ACTIVITIES

Construction and repair of the Bureau's hatcheries is a type of work which lends itself well to the Government's program of work-relief and public works construction. The average hatchery requires only limited structural improvements which carry heavy costs for material, while the development and enlargement of ponds and water supplies calls for a maximum of labor.

The Bureau therefore benefited greatly by cash allotments made by the Public Works Administration, by assignment of labor and funds under the Civil Works Administration, and by relief labor assigned by local authorities. Early in the year there was received from the Public Works Administration the sum of $281,500, providing $150,000 for the continuation of construction at 5 new hatcheries located in Alabama, Indiana, Pennsylvania, Texas, and West Virginia, with the balance, $131,500 available for repairs and reconditioning at 29 of the older hatcheries. The allotments were virtually all expended at the close of the year with the exception of a balance remaining for the Leetown (W. Va.) project. All of the new hatcheries were placed on a producing basis or greatly enlarged as to capacity. In the case of the Marion (Ala.) station, the pond area was increased approximately 300 percent and a number of buildings were constructed. These hatcheries were not fully completed up to the limits of their potentialities, however.

During the year two small additional allotments totaling $12,000, were made for further repairs and reconditioning work. Individual allotments to the various stations ranged from $1,000 to $8,500 and were expended for such activities as renewing docks, repairing and repainting buildings, repairing pipe lines and water-supply systems, enlarging and improving ponds, repairs to roads, and many other upkeep jobs required at establishments some of which have been in operation over 40 years.

At the inception of the C. W. A. program in late November, there was prepared a program providing for the employment of 2,440 men throughout the country and requiring $25,175 for materials and supplies. This was approved and the work was pushed vigorously in spite of adverse weather conditions in some sections. Forty different stations were selected as locations for this activity, providing for improvements at hatcheries which were not covered under the P. W. A. program and also supplementing the direct allotments at other points. For various reasons the maximum number of men employed at one time was 2,269, but activities were continued up to the close of the program at the end of April. The Marion (Ala.) hatchery was left in an unfinished state, however, and a cash allotment of $34,116 was received for the purpose of continuing the work after the formal expiration of the C. W. A. activities.

The net results, as far as the Bureau was concerned, were a significant increase in the capacity for hatchery production, the placing of plant and equipment in the highest state of repair and efficiency, and a reduction of charges for maintenance and repair which will release a greater proportion of the appropriation for strictly fish-cultural activities. The following list shows the location of P. W. A. projects and the amounts allotted to each:

Bureau of Fisheries, Public Works projects

Project designation	Location	Amount of allotment	Project designation	Location	Amount of allotment
F. P. 2	Boothbay Harbor, Maine	$3,000	F. P. 19	Ennis, Mont	$8,000
F. P. 3	Woods Hole, Mass	3,500	F. P. 20	Bozeman, Mont	4,000
F. P. 4	Hartsville, Mass	1,000	F. P. 21	Buhl, Idaho	5,000
F. P. 5	Lake Mills, Wis	5,000	F. P. 22	Pittsford, Vt	4,000
F. P. 6	Louisville, Ky	4,000	F. P. 23	Saratoga, Wyo	7,000
F. P. 7	Cape Vincent, N. Y	7,500	F. P. 24	Puget Sound, Wash	5,000
F. P. 8	National Forest, N. H	5,000	F. P. 25	Springville, Utah	2,000
F. P. 9	Northville, Mich	3,000	F. P. 26	Edenton, N. C	3,000
F. P. 10	Erwin, Tenn	2,500	F. P. 27	Leetown, W. Va	5,000
F. P. 11	Flintville, Tenn	5,000	F. P. 31	Marion, Ala	18,000
F. P. 12	Tishomingo, Okla	5,000	F. P. 32	Rochester, Ind	30,000
F. P. 13	Natchitoches, La	5,000	F. P. 33	Lamar, Pa	20,000
F. P. 14	Orangeburg, S. C	3,000	F. P. 34	San Angelo, Tex	20,000
F. P. 15	San Marcos, Tex	3,500	F. P. 35	Leetown, W. Va	53,000
F. P. 16	Lake Park, Ga	8,500	F. P. 36	Fort Humphreys, Va	3,500
F. P. 17	Warm Springs, Ga	3,500	F. P. 37	Wytheville, Va	6,000
F. P. 18	Dexter, N. Mex	5,000	F. P. 44	Fort Humphreys, Va	6,000

COOPERATION WITH OTHER CONSERVATION AGENCIES

The National Planning Council, formed at the instance of the Bureau of Fisheries for the purpose of coordinating activities of the Federal Bureau of Fisheries and the State fish and game departments, will find its most effective function in the propagation and distribution of fish. New fields for cooperation in the hatchery work have already been developed and older relations strengthened and expanded. From time to time there have arisen proposals to relinquish much of the Federal fish-cultural work to the States by transferring the hatcheries to their jurisdiction. The general reaction of the State authorities themselves to this move has been unfavorable, apparently in recognition of the fact that there need be no duplication or overlapping, if the work is properly coordinated. The following statements illustrate the extent to which, and the methods by which, efficiency and economy are being achieved by such coordination.

Practical procedure of cooperation in the rearing or planting of fish has already been placed in effect with 27 States. A number of States (Connecticut, Michigan, Montana, New York, and Idaho) review Federal applications before delivery in order that the plants may not conflict with State stocking policies. In a number of other States (Virginia, Georgia, Mississippi, North Carolina, Pennsylvania, Indiana, and Ohio) the actual handling of the fish is on a joint basis, fish from Federal hatcheries being used to fill State applications or vice versa. By this means the Bureau is relieved of distributing costs and fish are planted according to actual needs.

With regard to actual propagation work, in several instances the Bureau has pooled its facilities with other agencies for mutual benefit. This is true in the case of shad propagation in South Carolina, the whitefish and pike perch hatching carried on at Put in Bay, Ohio, and the county hatchery system in Monroe County, N. Y., where the Bureau operates an establishment which the local authorities have constructed. At Walhalla, S. C., unified efforts of the Bureau, the Forest Service, and local sportsmen have resulted in the construction of trout-rearing pools to be used in holding trout for distribution in surrounding waters. Cooperation with the State of Connecticut in the collection and distribution of smallmouth bass fry from closed waters was continued. Several of the Western States are still cooperating in the collection of black-spotted trout, being compensated by receiving a portion of the eggs. In Oregon and Washington the employees of the State and Federal hatcheries have closely coordinated their respective activities. The close relationships with the fish-cultural activities in the States of Maryland, Virginia, and West Virginia, were a continuation and extension of former policies.

Wherever the activities of the division have touched those of the United States Forest Service, the National Park Service, and the Bureau of Biological Survey, there has been evident a most gratifying willingness to cooperate. The two former agencies have aided by enabling the Bureau to procure from their warehouses supplies and materials needed for the Bureau's field work. This has resulted in decided economies. The Bureau of Biological Survey has directed its land-purchasing program in the Upper Mississippi Refuge so as to further the Bureau's fish-cultural work in that area as far as circumstances will permit. A full recital of the details of the various fields in which there has been joint and mutually beneficial action would be too voluminous.

An act passed by Congress in March 1934, known as the Coordinating Bill (Pub. No. 121) gave formal recognition to the necessity for closer relationships on the part of Federal agencies whose functions have to do with wildlife resources. Such organizations as the Bureau of Indian Affairs and the Reclamation Service are required to consult with the Bureau of Fisheries and/or the Bureau of Biological Survey when the welfare of fish and game is affected by the functions of the first-named organization. The act further authorizes investigation of the pollution problem and calls for a program for the protection of wildlife on Indian lands and reservations. There is also definite authorization for broad cooperation between Government conservation bureaus and all other agencies functioning in this field. No funds or machinery to enable the Bureaus concerned to carry out these aims are authorized, however. The value of the legislation has already been demonstrated by several instances wherein the Bureau of Fisheries has been consulted in connection with problems arising from developments on Indian reservations.

The Bureau has continued to aid private sportsmen's organizations and conservation groups by furnishing advice on fish-cultural problems and by the maintenance of the nursery or rearing-pond system. The development of trout or bass-rearing pools is generally one of the first tasks considered by a sportsmen's organization. The States are now active in developing this program which was largely pioneered by the Bureau and as a consequence there has been further reduction in the number of nurseries operated under the auspices of the Bureau. In 1934 there were 62 individual units in comparison with 88 in 1933. The number of fish supplied totaled 2,846,700 as against 3,561,350 the previous year. There follows a tabular statement showing details of this activity. It may be added that the Bureau has benefited greatly by the existence of the private conservation organizations, particularly those of national scope, owing to the readiness with which these groups can develop a public opinion favorable to true conservation principles and to the Bureau's objectives.

Cooperative nurseries and rearing ponds supervised by the Bureau in 1934

Locality	Number of fish supplied	Kind
Alabama: Citronelle.	32,000	Largemouth black bass.
Iowa: Hopkinton	2,000	Do
Massachusetts:		
Adams	26,000	Brook trout.
Springfield	25,000	Do.
Michigan:		
Au Sable	75,000	Do.
Do	26,000	Rainbow trout.
Charlevoix	12,500	Brook trout.
Do	25,000	Rainbow trout.
Harrison	160,000	Brook trout.
Do	10,000	Rainbow trout.
Highland	10,000	Brook trout.
Hillman	75,000	Do.
Do	25,000	Rainbow trout.
National City	100,000	Brook trout.
Vanderbilt	25,000	Rainbow trout.
Do	75,000	Brook trout.
Mississippi: Orange Grove.	38,000	Largemouth black bass.
Minnesota:		
Anoka	5,200	Brook trout.
Houston	6,600	Lock Leven trout.
Kasson	4,500	Largemouth black bass.
Kenyon	5,000	Rainbow trout.
Lake City	7,200	Brook trout.
Do	4,000	Rainbow trout.
Minneapolis	15,200	Lock Leven trout.
Northfield	4,000	Rainbow trout.
Red Wing	2,000	Brook trout.
Do	2,400	Rainbow trout.
Winona	9,600	Lock Leven trout.
New York:		
Arena	15,000	Lock Leven trout.
Beaver Falls	3,000	Brook trout.
Lowville	19,000	Do.
Malone	58,500	Do.
North Franklin	20,500	Do.
Do	33,000	Rainbow trout.
Do	14,000	Lock Leven trout.
Pennsylvania:		
Bethlehem	25,000	Brook trout.
Coatesville	7,500	Do.
Do	20,000	Rainbow trout.
Fairmont Springs	21,000	Brook trout.
Do	10,000	Lock Leven trout.
Franklin	10,000	Do.
Do	25,000	Rainbow trout.
Do	15,000	Lock Leven trout.
Hazelton	15,000	Brook trout.
Johnstown	7,000	Do.
Do	10,000	Rainbow trout.
Kane	4,000	Brook trout.
Marienville	4,000	Do.
Do	20,000	Lock Leven trout.
Muncy	10,000	Brook trout.
Do	10,000	Lock Leven trout.
Oil City	7,500	Brook trout.
Do	20,000	Rainbow trout.
Do	10,000	Lock Leven trout.
Scranton	30,000	Do.
Do	30,000	Brook trout.
Spring Mills	10,000	Rainbow trout.
Do	10,000	Brook trout.
Weikert	40,200	Rainbow trout.
Do	15,000	Lock Leven trout.

Cooperative nurseries and rearing ponds supervised by the Bureau in 1934—Contd.

Locality	Number of fish supplied	Kind	Locality	Number of fish supplied	Kind
Pennsylvania—Con.			Wisconsin—Con.		
White Haven	16,400	Brook trout.	Eau Claire	23,500	Brook trout.
Do	18,000	Rainbow trout.	Do	25,000	Rainbow trout.
Williamsport	70,000	Brook trout.	Elmwood	3,000	Brook trout.
Punxsutawney	4,000	Do.	Ellsworth	5,000	Lock Leven trout.
Vermont:			Elroy	15,000	Brook trout.
Averill	68,000	Do.	Galesville	20,000	Do.
Do	25,000	Atlantic salmon.	Gays Mills	5,000	Do.
Do	20,000	Landlocked salmon	Hazel Green	12,000	Do.
West Virginia:			Independence	25,000	Do.
Marlinton	600,000	Brook trout.	La Crosse	10,000	Do.
Do	372,000	Rainbow trout.	Do	15,000	Lock Leven trout.
Wisconsin:			Madison	3,000	Brook trout.
Appleton	5,000	Brook trout.	Do	3,000	Rainbow trout.
Arcadia	10,000	Do.	Do	3,000	Lock Leven trout.
Blue River	2,800	Do.	Manitowoc	20,000	Do.
Do	2,800	Rainbow trout.	Mindoro	15,000	Brook trout.
Do	2,800	Lock Leven trout.	Do	9,000	Rainbow trout.
Boscobel	5,000	Rainbow trout.	Monroe	28,000	Do.
Do	20,000	Brook trout.	Mountain	10,000	Do.

SALVAGE OPERATIONS

The removal and transfer to other waters of 22,873,000 fish taken in land-locked sloughs along the Upper Mississippi River was sharply below the normal extent of this work. In an average season, 50,000,000 fish may be salvaged and in some seasons as many as 75,000,000. The curtailment was due mainly to the reduced appropriations, which made it impossible to put sufficient crews into the field to cover the territory. As usual the greater proportion of the rescued fish were returned directly to the open waters of the Mississippi River. Greater dependence is being placed upon the fish produced in artificial ponds within the refuge for distribution in distant sections. In this connection one of the C. W. A. projects mentioned previously was the construction of a large pond within the refuge near Genoa, Wis. The rescue work is largely supported by funds appropriated for administration of fishery matters in the Upper Mississippi Wild Life Refuge.

Number and disposition of fish rescued, fiscal year 1934

Locality and species	Delivered to applicants	Restored to original waters	Total number fish rescued
All stations:			
Buffalo		82,000	82,000
Carp		1,254,000	1,254,000
Catfish	62,000	4,797,600	4,859,600
Crappie	56,700	9,357,600	9,414,300
Largemouth black bass	316,400	925,500	1,241,900
Fresh-water drum		6,600	6,600
Pike and pickerel		72,900	72,900
Smallmouth black bass	20,700		20,700
Sunfish	62,000	2,034,100	2,096,100
White bass		19,000	19,000
Yellow perch	24,100	2,016,100	2,040,200
Miscellaneous fishes		2,766,400	2,766,400
Total	541,900	23,331,800	23,873,700
Summary by stations:			
Fairport, Iowa	14,000	718,800	732,800
Homer, Minn	325,300	19,887,800	20,213,100
La Crosse, Wis	28,300	1,674,500	1,702,800
Refuge and cooperative ponds	174,300	1,050,700	1,225,000
Total	541,900	23,331,800	23,873,700

ASSIGNMENTS OF FISH EGGS TO STATES, TERRITORIES, AND FOREIGN COUNTRIES

The Bureau of Fisheries as usual served as the primary source of supply for a considerable number of fish eggs utilized at State hatcheries throughout the country. While the number of eggs supplied to the States was greatly in excess of that of the previous year a large proportion of the increase was due to the transfer of 830,000,000 pike perch eggs to the State hatchery in Ohio. These eggs were collected by the Bureau but the State's equipment was used in incubating them. However, making allowance for this circumstance, the assignment was approximately 43,850,000 in comparison with 39,171,000 for the previous year. They were furnished to 23 States in comparison with 22 which were the recipients of eggs the previous year. It is hoped to expand this feature of the work as far as possible in line with the program of closer cooperation with the State fish and game departments.

It should be further pointed out that many of the States, particularly in the West, cooperated in the collection of trout eggs and are consequently receiving eggs as compensation for their joint efforts.

With reference to shipments of eggs to foreign countries, the usual allotments were made to Canada on an exchange basis and there was a continuation of experiments in the introduction of rainbow trout to Ecuador. A new development was the effort to establish rainbow trout in Puerto Rico. A shipment of eggs was received in fair condition and a goodly proportion hatched. There is ample indication that there is a limited area of water suitable for trout in this insular possession.

Shipments of fish eggs to foreign countries, fiscal year 1934

Country and species	Eggs
Canada:	
Black-spotted trout	1,250,000
Loch Leven trout	300,000
Ecuador: Rainbow trout	100,000
Puerto Rico: Rainbow trout	45,000
Total	1,695,000

Assignments of fish eggs to State fish commissions, fiscal year 1934

State and species	Number
Arizona: Loch Leven trout	930,000
California:	
Brook trout	25,000
Rainbow trout	125,000
Colorado: Loch Leven trout	1,500,000
Connecticut: Loch Leven trout	100,000
Georgia:	
Loch Leven trout	151,000
Rainbow trout	602,000
Idaho:	
Black-spotted trout	3,500,000
Rainbow trout	1,549,000
Maine:	
Brook trout	1,400,000
Lake trout	500,000
Massachusetts:	
Loch Leven trout	100,000
Rainbow trout	200,000
Montana: Loch Leven trout	3,472,000
Nebraska:	
Loch Leven trout	200,000
Rainbow trout	428,000
Nevada: Rainbow trout	500,000
New Hampshire: Brook trout	1,000,000
New Mexico:	
Black-spotted trout	3,400,000
Loch Leven trout	1,000,000
Rainbow trout	734,000
North Carolina: Rainbow trout	100,000
Ohio: Pike perch	830,025,000
Oregon:	
Black-spotted trout	4,200,000
Chinook salmon	7,500,000
Loch Leven trout	500,000
Rainbow trout	164,000
South Carolina: Rainbow trout	400,000
South Dakota: Loch Leven trout	1,250,000
Tennessee: Rainbow trout	450,000
Utah: Loch Leven trout	1,000,000
Vermont:	
Brook trout	1,100,000
Rainbow trout	35,000
Washington:	
Loch Leven trout	500,000
Rainbow trout	110,000
Wyoming:	
Black-spotted trout	3,100,000
Loch Leven trout	2,033,000
Total	373,883,000

TRANSFER OF EGGS BETWEEN STATIONS

The Bureau is concentrating on the production of eggs of the different species of trout at the particular hatcheries where conditions are most suitable. This means economy in supplying the other hatcheries and avoids the necessity of utilizing valuable space and depleted funds for maintaining a brood stock at each hatchery to supply its own needs. The following table will indicate the extent to which this feature has been developed:

Transfer of eggs between stations, fiscal year 1934

Species	Number of eggs	From—	To—
Black-spotted trout	500,000	Bozeman, Mont	Glacier Park, Mont.
	100,000	do	Springville, Utah.
	1,000,000	Yellowstone Park, Wyo	Birdsview, Wash.
	250,000	do	Quilcene, Wash.
	5,958,000	do	Bozeman, Mont.
	2,200,000	do	Glacier Park, Mont.
	500,000	do	Madison Valley, Mont.
	400,000	do	Clackamas, Oreg.
	550,000	do	Butte Falls, Oreg.
	600,000	do	Crawford, Nebr.
	800,000	do	Hagerman, Idaho.
	200,000	do	Salmon, Idaho.
	600,000	do	Leadville, Colo.
	800,000	do	Creede, Colo.
	300,000	do	Quinault, Wash.
	150,000	do	Spearfish, S. Dak.
	700,000	do	Springville, Utah.
	1,000,000	do	Jackson Hole, Wyo.
Brook trout	320,000	Berkshire, Mass	Nashua, N. H.
	2,281,000	Berlin, N. H.	St. Johnsbury, Vt.
	100,000	do	Rochester, N. Y.
	50,000	do	Flintville, Tenn.
	300,000	do	Nashua, N. H.
	300,000	do	Northville, Mich.
	1,100,000	do	White Sulphur Springs, W. Va.
	86,000	Madison Valley, Mont	Bozeman, Mont.
	950,000	Craig Brook, Maine	Cape Vincent, N. Y.
	200,000	do	Barneveld, N. Y.
	300,000	do	Ithaca, N. Y.
	100,000	do	Duluth, Minn.
	655,000	do	Erwin, Tenn.
	14,000	do	Nashua, N. H.
	400,000	do	White Sulphur Springs, W. Va.
	700,000	do	Wytheville, Va.
	300,000	Leadville, Colo	Bozeman, Mont.
	200,000	do	Duluth, Minn.
	100,000	do	Lake Mills, Wis.
	75,000	do	Eagle Nest Lake, N. Mex.
	300,000	do	Saratoga, Wyo.
	360,000	do	Springville, Utah.
	300,000	do	Bear Lake, Utah.
	489,000	Creede, Colo	Crawford, Nebr.
	204,000	do	Hagerman, Idaho.
	750,000	do	Saratoga, Wyo.
	15,000	Pittsford, Vt	Leetown, W. Va.
	184,000	do	White Sulphur Springs, W. Va.
Chinook salmon	1,132,000	Mills Creek, Calif	Baird, Calif.
	60,000	Butte Falls, Oreg	Clackamas, Oreg.
	25,000	Little White Salmon, Wash.	Central station, Washington, D. C.
	500,000	do	Clackamas, Oreg.
	1,500,000	do	Puget Sound stations, Wash.
Grayling	500,000	Yellowstone Park, Wyo	Glacier Park, Mont.
	53,000	do	Salt Lake City, Utah.
Lake trout	15,000	Duluth, Minn	Leadville, Colo.
Landlocked salmon	15,000	Craig Brook, Maine	Nashua, N. H.
	20,000	do	Bear Lake, Utah.
Loch Leven trout	150,000	Madison Valley, Mont	Birdsview, Wash.
	16,373,000	do	Bozeman, Mont.
	179,000	do	Cape Vincent, N. Y.
	50,000	do	Ithaca, N. Y.
	75,000	do	Rochester, N. Y.

Transfer of eggs between stations, fiscal year 1934—Continued

Species	Number of eggs	From—	To—
Loch Leven trout—Con.	251,000	Madison Valley, Mont	Crawford, Nebr.
	203,000	do	Duluth, Minn.
	200,000	do	Flintville, Tenn.
	250,000	do	Hagerman, Idaho.
	751,000	do	La Crosse, Wis.
	201,000	do	Lake Mills, Wis.
	250,000	do	Leadville, Colo.
	109,000	do	Creede, Colo.
	202,000	do	Leetown, W. Va.
	26,000	do	Nashua, N. H.
	203,000	do	Northville, Mich.
	559,000	do	Saratoga, Wyo.
	603,000	do	Spearfish, S. Dak.
	937,000	do	Springville, Utah.
	300,000	do	White Sulphur Springs, W. Va.
	62,000	Leadville, Colo	Eagle Nest Lake, N. Mex.
Rainbow trout	100,000	Madison Valley, Mont	Glacier Park, Mont.
	75,000	do	Rochester, N. Y.
	100,000	do	Bear Lake, Utah.
	82,000	Hagerman, Idaho	Birdsview, Wash.
	835,000	Salmon, Idaho	Hagerman, Idaho.
	500,000	Eagle Nest Lake, N. Mex	Crawford, Nebr.
	650,000	do	Leadville, Colo.
	1,075,000	do	Creede, Colo.
	150,000	do	Spearfish, S. Dak.
	103,000	Manchester, Iowa	Duluth, Minn.
	210,000	do	Hagerman, Iowa.
	309,000	do	La Crosse, Wis.
	64,000	do	Lake Mills, Wis.
	175,000	do	Leadville, Colo.
	144,000	do	Creede, Colo.
	306,000	do	Northville, Mich.
	150,000	Neosho, Mo	Bozeman, Mont.
	400,000	do	Saratoga, Wyo.
	250,000	do	Springville, Utah.
	500,000	Bourbon, Mo	Bozeman, Mont.
	500,000	do	Crawford, Nebr.
	200,000	do	Saratoga, Wyo.
	10,000	White Sulphur Springs, W. Va	Central station, Washington, D. C.
	50,000	Wytheville, Va	Barneveld, N. Y.
	75,000	do	Rochester, N. Y.
	25,000	do	Central station, Washington, D. C.
	180,000	do	Flintville, Tenn.
	100,000	do	Leetown, W. Va.
Sockeye salmon	348,000	Baker Lake, Wash	Quilcene, Wash.
Whitefish	400,000	Put in Bay, Ohio	Central station, Washington, D. C.
	60,000	do	Salt Lake City, Utah.

OUTPUT OF FISH

The formal closure of a number of the hatcheries reduced the producing units for 1934 to a total of 83, comprising 42 main stations and 41 substations; this was a reduction of 8. Some of the establishments which are listed in the following table as being in operation were closed during the fiscal year so that at the end of the period a still smaller number of hatcheries was in operation. These stations are located in 38 States and the Territory of Alaska. The output was distributed to practically every State, however.

Stations and substations operated and the output of each, fiscal year 1934

[Asterisk (*) denotes transfer of eggs to outside agencies]

Stations, substations, and species	Eggs	Fry	Fingerlings, yearlings, and adults	Total [1]
Baird, Calif.: Chinook salmon			1,168,600	1,168,600
Battle Creek, Calif.: Chinook salmon			1,379,100	1,379,100
Mill Creek, Calif.: Chinook salmon	*1,132,000		1,177,100	2,309,100
Baker Lake, Wash.:				
Silver salmon		6,500		6,500
Sockeye salmon			399,000	399,000
Birdsview, Wash.:				
Black-spotted trout			94,910	94,910
Brook trout			376,000	376,000
Chinook salmon		385,000	350,000	735,000
Silver salmon		1,076,000	124,000	1,200,000
Sockeye salmon			685,000	685,000
Steelhead salmon	*110,000		1,145,000	1,255,000
Mount Rainier, Wash.:				
Black-spotted trout			239,900	239,900
Brook trout			130,000	130,000
Loch Leven trout			86,000	86,000
Rainbow trout			94,000	94,000
Berkshire trout hatchery, Mass.:				
Brook trout			170,855	170,855
Smallmouth black bass		[2] 584,000	271	584,271
Berlin, N. H.: Brook trout	*2,100,000	[3] 674,000	[4] 492,160	3,266,160
St. Johnsbury, Vt.:				
Brook trout		[5] 2,251,256		2,251,256
Landlocked salmon			8,025	8,025
Loch Leven trout			15,400	15,400
Boothbay Harbor, Maine:				
Cod	1,037,262,000			1,037,262,000
Haddock	191,754,000			191,754,000
Winter flounder		809,811,000		809,811,000
Bozeman, Mont.:				
Black-spotted trout			2,397,900	2,397,900
Brook trout			[6] 418,376	418,376
Loch Leven trout			252,050	252,050
Rainbow trout			516,600	516,600
Glacier Park, Mont.:				
Black-spotted trout			1,090,297	1,090,297
Brook trout			2,880	2,880
Rainbow trout			179,400	179,400
Madison Valley, Mont.:				
Black-spotted trout			73,440	73,440
Brook trout			2,300	2,300
Loch Leven trout	*16,391,490	7,614,500	1,288,200	25,294,190
Rainbow trout	*50,100		505,600	555,700
Miles City, Mont.:				
Largemouth black bass			[7] 35,789	35,789
Catfish			[8] 10,476	10,476
Crappie			[9] 26,863	26,863
Sunfish			[10] 108,355	108,355
Yellow perch			[11] 103,259	103,259
Miscellaneous			[12] 28,239	28,239
Cape Vincent, N. Y.:				
Brook trout		586,720		586,720
Lake trout		162,500		162,500
Loch Leven trout		111,400		111,400
Rainbow trout			14,800	14,800
Smallmouth black bass			28,075	28,075
Barneveld, N. Y.:				
Brook trout			89,495	89,495
Loch Leven trout			22,700	22,700
Rainbow trout			20,392	20,392

[1] Loss in transit 44,159.
[2] Includes 293,000 smallmouth black-bass fry turned over to the State of Connecticut in cooperative work.
[3] Includes 400,000 fry brook trout turned over to the State of New Hampshire in cooperative work.
[4] Includes 95,280 fingerling brook trout turned over to the State of New Hampshire and 96,000 fingerling brook trout turned over to the State of Vermont in cooperative work.
[5] Includes 500,000 fry brook trout turned over to the State of New Hampshire and 900,000 fry brook trout turned over to the State of Vermont in cooperative work.
[6] Includes 7,600 fingerling brook trout turned over to the State of Montana in cooperative work.
[7] Includes 280,089 fingerling largemouth black bass turned over to the State of Montana in cooperative work.
[8] Includes 8,872 fingerling catfish turned over to the State of Montana in cooperative work.
[9] Includes 15,726 fingerling crappie turned over to the State of Montana in cooperative work.
[10] Includes 73,205 fingerling sunfish turned over to the State of Montana in cooperative work.
[11] Includes 74,247 fingerling yellowperch turned over to the State of Montana in cooperative work.
[12] Includes 25,743 fingerling miscellaneous fishes turned over to the State of Montana in cooperative work.

Stations and substations operated and the output of each, fiscal year 1934—Continued

[Asterisk (*) denotes transfer of eggs to outside agencies]

Stations, substations, and species	Eggs	Fry	Fingerlings, yearlings, and adults	Total
Cape Vincent, N. Y.—Continued.				
Ithaca, N. Y.:				
Brook trout			29,040	29,040
Rainbow trout			25,290	25,290
Rochester, N. Y.:				
Largemouth black bass			4,233	4,233
Smallmouth black bass			14,540	14,590
Watertown, N. Y.:				
Brook trout			143,050	143,050
Lake trout			50,938	50,938
Loch Leven trout			39,850	39,850
Rainbow trout			64,830	64,830
Clackamas, Oreg.:				
Brook trout			150,000	150,000
Chinook salmon			[13] 1,000,000	1,000,000
Loch Leven trout			[14] 140,000	140,000
Rainbow trout			[15] 215,000	215,000
Big White Salmon, Wash.:				
Black-spotted trout			105	105
Brook trout			[16] 115,500	115,500
Chinook salmon	*2,000,000		4,608,000	6,608,000
Loch Leven trout			[17] 8,850	8,850
Butte Falls, Oreg.:				
Black-spotted trout			[18] 320,240	320,240
Chinook salmon			927,176	927,176
Silver salmon		[19] 299,000	272,576	571,576
Steelhead salmon			[20] 316,230	316,230
Little White Salmon, Wash.:				
Chinook salmon	* 5,500,000		7,776,000	13,276,000
Chum salmon		50,000	236,500	286,500
Sockeye salmon			100,141	100,141
Craig Brook, Maine:				
Brook trout	* 1,400,000	85,000	866,075	2,351,075
Landlocked salmon			149,000	149,000
Grand Lake Stream, Maine:				
Atlantic salmon			20,890	20,890
Brook trout			35,265	35,265
Landlocked salmon			261,220	261,220
Crawford, Nebr.:				
Largemouth black bass			[21] 229,740	229,740
Black-spotted trout			492,000	492,000
Brook trout			267,525	267,525
Catfish			[22] 242,000	242,000
Crappie			7,500	7,500
Loch Leven trout			43,600	43,600
Rainbow trout			521,700	521,700
Rock bass			2,000	2,000
Sunfish			12,070	12,070
Yellow perch			38,000	38,000
Dexter, N. Mex.:				
Largemouth black bass			[23] 514,875	514,875
Catfish			7,400	7,400
Sunfish			36,950	36,950
Duluth, Minn.:				
Brook trout			197,500	197,500
Lake trout		623,000		623,000
Loch Leven trout			138,000	138,000
Pike perch		6,600,000		6,600,000
Rainbow trout			33,000	33,000
Whitefish		440,000		440,000
Edenton, N. C.:				
Largemouth black bass		[24] 147,000	[25] 39,688	186,688
Catfish			3,000	3,000
Crappie			[26] 3,525	3,525
Shad		3,500,000		3,500,000
Sunfish			[27] 10,300	10,300
White perch		900,000		900,000
Yellow perch		[28] 4,000,000	75	4,000,075
Erwin, Tenn.:				
Largemouth black bass			1,975	1,975
Brook trout			232,000	232,000
Rainbow trout			306,780	306,780
Rock bass			10,000	10,000
Sunfish			34,200	34,200

[13] Includes 150,000 fingerling chinook salmon turned over to the State of Oregon in cooperative work.
[14] Includes 115,000 fingerling Loch Leven trout turned over to the State of Oregon in cooperative work.
[15] Includes 215,000 fingerling rainbow trout turned over to the State of Oregon in cooperative work.
[16] Includes 38,900 fingerling brook trout turned over to the State of Oregon and 36,500 fingerling brook trout turned over to the State of Washington in cooperative work.
[17] Includes 7,850 fingerling Loch Leven trout turned over to the State of Washington in cooperative work

Stations and substations operated and the output of each, fiscal year 1934—Continued

[Asterisk (*) denotes transfer of eggs to outside agencies]

Stations, substations, and species	Eggs	Fry	Fingerlings, yearlings, and adults	Total
Fairport, Iowa:				
Largemouth black bass			73,195	73,195
Buffalofish		5,000	[29] 37,600	42,600
Carp		290,000	[29] 494,850	784,850
Catfish		5,000	220,000	225,000
Crappie			35,200	35,200
Pike and pickerel			55	55
Smallmouth black bass			[30] 12,020	12,020
Sunfish			47,407	47,407
White bass			485	485
Miscellaneous fishes			16,300	16,300
Flintville, Tenn.:				
Largemouth black bass			8,000	8,000
Brook trout			14,350	14,350
Loch Leven trout			[31] 49,500	49,500
Rainbow trout			[32] 84,000	84,000
Smallmouth black bass			30	30
Fort Humphreys, Va.: Shad		6,450,000		6,450,000
Dumfries, Va.:				
Largemouth black bass			1,420	1,420
Sunfish			460	460
Featherstone, Va.:				
Largemouth black bass			462	462
Sunfish			6,100	6,100
Lakeland, Md.:				
Largemouth black bass			6,163	6,163
Crappie			100	100
Sunfish			33,105	33,105
Hagerman, Idaho:				
Black-spotted trout			360,000	360,000
Brook trout			60,000	60,000
Chinook salmon	*60,000		159,250	219,250
Loch Leven trout			100,000	100,000
Rainbow trout	*30,000		643,000	673,000
Steelhead salmon			[33] 127,000	127,000
Salmon, Idaho:				
Black-spotted trout			90,150	90,150
Rainbow trout	*100,000		364,670	464,670
La Crosse, Wis.:				
Largemouth black bass			[34] 166,100	166,100
Brook trout			503,050	503,050
Carp			[29] 82,100	82,100
Catfish			[35] 665,000	665,000
Crappie			[36] 441,000	441,000
Lake trout	*500,000			500,100
Loch Leven trout			359,200	359,200
Pike and pickerel			7,975	7,975
Rainbow trout			262,200	262,200
Smallmouth black bass			[37] 6,512	6,512

[18] Includes 320,240 fingerling black-spotted trout turned over to the State of Oregon in cooperative work.
[19] Includes 299,000 fry silver salmon turned over to the State of Oregon in cooperative work.
[20] Includes 216,230 fingerling steelhead salmon turned over to the State of Oregon in cooperative work.
[21] Includes 55,000 fingerling largemouth black bass turned over to the State of Wyoming in cooperative work.
[22] Includes 50,000 fingerling catfish turned over to the State of Wyoming in cooperative work.
[23] Includes 21,000 fingerling largemouth black bass turned over to the State of New Mexico in cooperative work.
[24] Includes 37,000 fry largemouth black bass turned over to the State of North Carolina in cooperative work.
[25] Includes 6,250 fingerling largemouth black bass turned over to the State of North Carolina in cooperative work.
[26] Includes 600 fingerling crappie turned over to the State of North Carolina in cooperative work.
[27] Includes 400 fingerling sunfish turned over to the State of North Carolina in cooperative work.
[28] Includes 50,000 fry yellow perch turned over to the State of North Carolina in cooperative work.
[29] All carp and buffalofish shown in above table are planted in commercial areas of the Mississippi River.
[30] Includes 900 fingerling smallmouth black bass turned over to the State of Illinois and 1,000 fingerling smallmouth black bass turned over to the State of Iowa in cooperative work.
[31] Includes 23,000 fingerling Loch Leven trout turned over to the State of Tennessee in cooperative work.
[32] Includes 37,000 fingerling rainbow trout turned over to the State of Tennessee in cooperative work.
[33] Includes 45,000 fingerling steelhead salmon turned over to the State of Idaho in cooperative work.
[34] Includes 400 fingerling largemouth black bass turned over to the State of Illinois and 39,720 fingerling largemouth black bass turned over to the State of Wisconsin in cooperative work.
[35] Includes 400 fingerling catfish turned over to the State of Illinois and 128 fingerling catfish turned over to the State of Wisconsin in cooperative work.
[36] Includes 1,950 fingerling crappie turned over to the State of Illinois and 7,450 fingerling crappie turned over to the State of Wisconsin in cooperative work.
[37] Includes 2,500 fingerling smallmouth black bass turned over to the State of Wisconsin in cooperative work.

Stations and substations operated and the output of each, fiscal year 1934—Continued

[Asterisk (*) denotes transfer of eggs to outside agencies]

Stations, substations, and species	Eggs	Fry	Fingerlings, yearlings, and adults	Total
La Crosse, Wis.—Continued.				
Sunfish			[38] 159,010	159,010
Yellow perch			103,300	103,300
Miscellaneous fishes			73,400	73,400
Bellevue, Iowa:				
Buffalofish	[29] 4,950,000			4,950,000
Carp	[29] 4,250,000			4,250,000
Ferryville, Wis.: Buffalofish	[29] 1,800,000			1,800,000
Guttenberg, Iowa:				
Buffalofish	[29] 975,000			975,000
Carp	[29] 2,000,000			2,000,000
Homer, Minn.:				
Largemouth black bass			[39] 997,110	997,110
Buffalofish			[29] 13,350	13,350
Carp			[29] 717,905	717,905
Catfish			[40] 3,899,300	3,899,300
Crappie			[41] 8,680,500	8,680,500
Fresh-water drum			6,580	6,580
Pike and pickerel			60,100	60,100
Smallmouth black bass			500	500
Sunfish			[42] 1,574,300	1,574,300
White bass			13,550	13,550
Yellow perch			1,918,375	1,918,375
Miscellaneous fishes			2,331,600	2,331,600
Lake Mills, Wis.:				
Largemouth black bass			11,700	11,700
Brook trout			47,000	47,000
Lock Leven trout			22,000	22,000
Rainbow trout			55,000	55,000
Smallmouth black bass			2,000	2,000
Lynxville, Wis.: Smallmouth black bass			14,250	14,250
Refuge and Cooperative Ponds, Upper Mississippi River:				
Largemouth black bass			78,000	78,000
Buffalofish			34,080	34,080
Carp			35,037	35,037
Catfish			70,348	70,348
Crappie			269,380	269,380
Pike and pickerel			4,755	4,755
Smallmouth black bass			20,750	20,750
Sunfish			338,590	338,590
Yellow perch			18,550	18,550
White bass			4,910	4,910
Miscellaneous fishes			352,100	352,100
Rochester, Ind.:				
Largemouth black bass			[43] 112,350	112,350
Sunfish			300	300
Yellow perch			2,400	2,400
Leadville, Colo.:				
Black-spotted trout			475,000	475,000
Brook trout			4,148,130	4,148,130
Lake trout			14,000	14,000
Loch Leven trout			781,000	781,000
Rainbow trout			1,047,400	1,047,400
Creede, Colo.:				
Black-spotted trout			449,500	449,500
Brook trout	*1,620,699		2,285,600	3,906,299
Loch Leven trout			71,500	71,500
Rainbow trout	*244,705		497,620	742,325
Eagle Nest Lake, N. Mex.:				
Brook trout			904,500	904,500
Loch Leven trout			16,000	16,000
Rainbow trout	*784,000		1,112,000	1,896,000

[29] All carp and buffalofish shown in above table are planted in commercial areas of the Mississippi River.
[38] Includes 2,000 fingerling sunfish turned over to the State of Illinois and 18,660 fingerling sunfish turned over to the State of Wisconsin in cooperative work.
[39] Includes 31,610 fingerling largemouth black bass turned over to the State of Wisconsin in cooperative work.
[40] Includes 29,060 fingerling catfish turned over to the State of Wisconsin in cooperative work.
[41] Includes 8,550 fingerling crappie turned over to the State of Wisconsin in cooperative work.
[42] Includes 16,340 fingerling sunfish turned over to the State of Wisconsin in cooperative work.
[43] Includes 41,150 fingerling largemouth black bass turned over to the State of Indiana in cooperative work.

Stations and substations operated and the output of each, fiscal year 1934—Continued

[Asterisk (*) denotes transfer of eggs to outside agencies]

Stations, substations, and species	Eggs	Fry	Fingerlings, yearlings, and adults	Total
Leetown, W. Va.:				
Brook trout			[44] 217, 654	217, 654
Loch Leven trout			[45] 74, 330	74, 330
Rainbow trout			[46] 144, 044	144, 044
Louisville, Ky.:				
Largemouth black bass		154, 000	9, 310	163, 310
Crappie			1, 225	1, 225
Rock bass			25, 575	25, 575
Smallmouth black bass		309, 500	[47] 3, 173	312, 673
Sunfish			[48] 24, 600	24, 600
Mammoth Spring, Ark.:				
Largemouth black bass			203, 400	203, 400
Rock bass			2, 360	2, 360
Smallmouth black bass		25, 000	159, 300	184, 300
Sunfish			44, 500	44, 500
Manchester, Iowa:				
Brook trout			167, 725	167, 725
Rainbow trout	* 1, 691, 000		[49] 153, 285	1, 844, 285
Rock bass			11, 000	11, 000
Smallmouth black bass			8, 500	8, 500
Nashua, N. H.:				
Brook trout			[50] 500, 500	500, 500
Catfish			300	300
Landlocked salmon			12, 600	12, 600
Rainbow trout			[51] 174, 600	174, 600
Smallmouth black bass		12, 000	445	12, 445
Neosho, Mo.:				
Largemouth black bass			215, 290	215, 290
Crappie			21, 230	21, 230
Rainbow trout	* 502, 000		33, 156	535, 156
Rock bass			3, 220	3, 220
Sunfish			21, 280	21, 280
Bourbon, Mo.: Rainbow trout	* 1, 000, 000			1, 000, 000
Langdon, Kans.:				
Largemouth black bass			23, 740	23, 740
Catfish			460	460
Crappie			2, 650	2, 650
Rock bass			2, 300	2, 300
Sunfish			1, 780	1, 780
Yellow perch			2, 540	2, 540
Natchitoches, La.:				
Largemouth black bass			45, 538	45, 538
Sunfish			331, 140	331, 140
Warmouth bass			12, 950	12, 950
Tishomingo, Okla.:				
Largemouth black bass			48, 992	48, 992
Catfish			2, 702	2, 702
Crappie			16, 400	16, 400
Rock bass			29	29
Sunfish			53, 705	53, 705
Warmouth bass			102	102
Yellow perch			1, 866	1, 866
Northville, Mich.:				
Largemouth black bass			23, 450	23, 450
Brook trout			[52] 707, 500	707, 500
Loch Leven trout			[53] 137, 465	137, 465
Rainbow trout			348, 500	348, 500
Smallmouth black bass			51, 900	51, 900
Steelhead salmon		72, 745		72, 745
Alpena, Mich.: Lake trout			318, 500	318, 500

[44] Includes 3,400 fingerling brook trout truned over to the State of West Virginia in cooperative work.
[45] Includes 5,000 fingerling Loch Leven trout turned over to the State of West Virginia in cooperative work.
[46] Includes 8,197 fingerling rainbow trout turned over to the State of Maryland, 25,000 fingerling rainbow trout turned over to the State of Pennsylvania, 16,200 fingerling rainbow trout turned over to the State of Virginia, and 5,750 fingerling rainbow trout turned over to the State of West Virginia in cooperative work.
[47] Includes 30,000 fry smallmouth black bass turned over to the State of Kentucky in cooperative work.
[48] Includes 19,000 fingerling sunfish turned over to the State of Kentucky in cooperative work.
[49] Includes 160,500 fingerling rainbow trout turned over to the State of Iowa in cooperative work.
[50] Includes 255,000 fingerling brook trout turned over to the State of New Hampshire in cooperative work.
[51] Includes 124,000 fingerling rainbow trout turned over to the State of New Hampshire in cooperative work.
[52] Includes 27,500 fingerling brook trout turned over to the State of Indiana in cooperative work.
[53] Includes 20,000 fingerling Loch Leven trout turned over to the State of Indiana and 65,000 fingerling Loch Leven trout turned over to the State of Ohio in cooperative work.

Stations and substations operated and the output of each, fiscal year 1934—Continued

[Asterisk (*) denotes transfer of eggs to outside agencies]

Stations, substations, and species	Eggs	Fry	Fingerlings, yearlings, and adults	Total
Orangeburg, S. C.:				
Largemouth black bass			[54] 228,796	228,796
Catfish			3,628	3,628
Crappie			272	272
Shad		1,624,000		1,624,000
Sunfish			93,932	93,932
Warmouth bass			670	670
Yellow perch			3,425	3,425
Put in Bay, Ohio:				
Pike perch	* 830,025,000			830,025,000
Whitefish	* 60,000	[55] 8,850,000		8,910,000
Pittsford, Vt.:				
Brook trout	* 25,000		80,935	105,935
Rainbow trout			5,375	5,375
Quinault, Wash.:				
Brook trout			[56] 343,100	343,100
Chinook salmon			124,400	124,400
Silver salmon			129,350	129,350
Sockeye salmon		5,450,000	2,620,000	8,070,000
Quilcene, Wash.:				
Brook trout			264,000	264,000
Chinook salmon			355,000	355,000
Chum salmon		4,817,000		4,817,000
Humpback salmon		24,175		24,175
Rainbow trout			65,000	65,000
Silver salmon			487,000	487,000
Sockeye salmon			267,000	267,000
Steelhead salmon			290,500	290,500
Duckabush, Wash.:				
Brook trout			63,000	63,000
Chinook salmon		373,600		373,600
Chum salmon		6,754,000		6,754,000
Humpback salmon		114,500		114,500
Silver salmon		48,000	90,000	138,000
Steelhead salmon			53,500	53,500
San Marcos, Tex.:				
Largemouth black bass		104,500	156,885	261,385
Catfish			4,415	4,415
Crappie			3,636	3,636
Rio Grande perch			8,840	8,840
Sunfish			66,625	66,625
Lake Worth, Tex.:				
Largemouth black bass			385,265	385,265
Catfish			2,765	2,765
Crappie			13,690	13,690
Sunfish			64,000	64,000
Warmouth bass			800	800
Saratoga, Wyo.:				
Black-spotted trout			707,935	707,935
Brook trout			1,461,970	1,461,970
Loch Leven trout			639,610	639,610
Rainbow trout			677,630	677,630
Spearfish, S. Dak.:				
Brook trout			[57] 796,670	796,670
Loch Leven trout			493,455	493,455
Rainbow trout			1,003,825	1,003,825
Springville, Utah:				
Largemouth black bass			5,039	5,039
Black-spotted trout			337,000	337,000
Brook trout			[58] 491,850	491,850
Loch Leven trout			463,076	463,076
Rainbow trout	*50,220		1,620,108	1,670,328
Bear Lake, Utah:				
Brook trout			660,550	660,550
Landlocked salmon			43,291	43,291
Tupelo, Miss.:				
Largemouth black bass		27,000	325,880	352,880
Sunfish			209,839	209,839
Marion, Ala.:				
Largemouth black bass		7,000	132,698	139,698
Crappie			600	600
Sunfish			157,850	157,850

[54] Includes 50,100 fingerling largemouth black bass turned over to the State of South Carolina in cooperative work.
[55] Turned over to the State of Ohio in cooperative work.
[56] Includes 266,000 fingerling brook trout turned over to the State of Washington in cooperative work.
[57] Includes 500 fingerling brook trout turned over to the State of South Dakota in cooperative work.
[58] Includes 65,000 fingerling brook trout turned over to the State of Utah in cooperative work.

Stations and substations operated and the output of each, fiscal year 1934—Continued

[Asterisk (*) denotes transfer of eggs to outside agencies]

Stations, substations, and species	Eggs	Fry	Fingerlings, yearlings, and adults	Total
Valdosta, Ga.:				
Largemouth black bass			[59] 39,240	39,240
Catfish			600	600
Sunfish			[60] 7,275	7,275
Warm Springs, Ga.:				
Largemouth black bass		60,000	222,150	282,150
Sunfish			429,000	429,000
White Sulphur Springs, W. Va.:				
Largemouth black bass			7,550	7,550
Brook trout			[61] 1,821,202	1,821,202
Loch Leven trout			169,606	169,606
Rainbow trout	*200,900		[62] 834,662	1,035,562
Rock bass			3,521	3,521
Sunfish			3,241	3,241
Woods Hole, Mass.:				
Mackerel		2,946,000		2,946,000
Winter flounder	*46,077,000	81,474,000		127,551,000
Wytheville, Va.:				
Largemouth black bass			5,398	5,398
Brook trout			[63] 377,140	377,140
Catfish			2,000	2,000
Loch Leven trout			3,000	3,000
Rainbow trout	*1,205,000		[64] 826,085	2,031,085
Rock bass			24,876	24,876
Smallmouth black bass			2,505	2,505
Sunfish			[65] 85,435	85,435
Yellowstone Park, Wyo.:				
Black-spotted trout	*17,015,000		8,300,000	25,315,000
Grayling	*219,000	4,950,320		5,169,320
Yes Bay, Alaska: Sockeye salmon			14,073,000	14,073,000

[59] Includes 10,500 fingerling largemouth black bass turned over to the State of Georgia in cooperative work.
[60] Includes 2,015 fingerling sunfish turned over to the State of Georgia in cooperative work.
[61] Includes 861,912 fingerling brook trout turned over to the State of West Virginia in cooperative work.
[62] Includes 448,650 fingerling rainbow trout turned over to the State of West Virginia in cooperative work.
[63] Includes 77,100 fingerling brook trout turned over to the State of Virginia in cooperative work.
[64] Includes 107,000 fingerling rainbow trout turned over to the State of North Carolina and 124,500 fingerling rainbow trout turned over to the State of Virginia in cooperative work.
[65] Includes 4,800 fingerling sunfish turned over to the State of Virginia in cooperative work.

EGG COLLECTIONS

The drop in the collection of eggs or the raw material of the hatchery operations is comparable to the decline in the total output. It will be noted from the following table that the collection of eggs of the game fish, particularly the trout, was equal to or above the records of the previous year. The decline occurred chiefly in the commercial species although there was a marked increase in the take of pike-perch eggs. Both the cod and winter flounder eggs were taken in numbers in excess of one billion each, even though operations for these species were conducted on a curtailed basis. It is not possible to compare the egg collections for the year with the output for the same period and determine the percentage mortality by this means, owing to the fact that a considerable number of game fish are held over for distribution as fingerlings and consequently will appear in the output figures for the succeeding year.

Comparisons of egg collections, fiscal years 1933 and 1934

Species	1933	1934	Species	1933	1934
Shad	27,355,000	17,104,000	Brook trout	23,833,130	28,331,758
Whitefish	211,452,500	12,000,000	Dolly Varden trout	175,000	....
Chinook salmon	55,268,300	28,323,000	Grayling	2,118,400	2,118,400
Chum salmon	22,651,000	12,370,000	Pike perch	206,925,000	840,920,300
Humpback salmon	3,082,500	158,000	Yellow perch	125,020,000	6,430,000
Silver salmon	5,885,000	2,148,000	White perch	5,400,000	1,600,000
Sockeye salmon	62,566,800	9,157,000	Cod	2,121,060,000	1,037,262,000
Steelhead salmon	3,065,300	905,000	Haddock	747,192,000	191,754,000
Landlocked salmon	840,000	35,300	Pollock	19,429,000	....
Rainbow trout	22,414,700	25,770,253	Winter flounder	3,532,946,000	1,036,626,000
Black-spotted salmon	26,667,700	28,946,550	Mackerel	7,164,000	8,592,000
Lock Leven trout	22,881,100	29,329,624			
Lake trout	33,414,000	1,850,120	Total	7,490,472,430	3,315,039,305

NOTES ON OPERATIONS

COMMERCIAL SPECIES

Pacific salmon.—The output of salmon from the Pacific coast hatcheries showed a decline for all species. This was caused by the closure of the Alaska hatcheries and the curtailment of work in the States. There has, however, been a gradual increase in the output of the game fishes which accordingly contributed to the increase in the total of these forms.

The Afognak (Alaska) station was closed at the start of the year and the Yes Bay (Alaska) station was closed shortly afterward but had distributed over 14,000,000 fingerling sockeye salmon which were on hand at the opening of the period.

In the Columbia River territory operations were carried on at 5 permanent stations and 1 egg-collecting unit with headquarters at the Clackamas (Oreg.) station. The total egg collection of the field for the entire year proved quite disappointing as only 27,000,000 eggs were secured in comparison with 60,500,000 during the preceding year. In some instances the decrease was a direct result of curtailment of funds while at other points, as at the Rogue River substation, abnormal water conditions were responsible. The take of eggs at both the Big White and Little White Salmon substations was markedly reduced for reasons which cannot be explained other than to state that the run of fish was below normal.

The Clackamas (Oreg.) station was the beneficiary of a C. W. A. project which resulted in the construction of additional rearing ponds, development of a water-supply reservoir, and repairs to some of the buildings.

The Salmon (Idaho) substation was closed during the greater part of the year but was utilized for the eyeing of salmon eggs and the rearing of trout eggs collected locally.

The Quinault (Wash.) substation had a subnormal collection of sockeye salmon eggs arising from severe floods interfering with seining operations during the egg-collecting season. Further effort was devoted to rearing the maximum number of sockeyes to fingerling size before distribution. This station initiated the culture of trout on a more intensive scale, distributing over 300,000 brook trout. A C. W. A. project was approved for the Quinault station, resulting in the construction of one rearing pond, the grading of the station grounds, and the installation of several hundred feet of curbing.

During the fiscal year the Quilcene and Duckabush (Wash.) stations were transferred to the jurisdiction of the Quinault station. As usual these two establishments concentrated on the propagation of chum salmon, eggs of which are available in large numbers. However, other species of salmon, including silvers, humpbacks, steelheads, chinooks, and eastern brook trout were also handled.

At the Birdsview (Wash.) station operations other than of a fish-cultural and routine nature consisted of the installation of a concrete floor in the hatchery, the diversion of Grandy Creek to the Skagit River in order to avoid the possibility of flooding the station grounds, and the partial completion of an additional cottage for residence purposes. Experiments in the marking of sockeye salmon fingerlings for securing life history information were continued.

The Baker Lake (Wash.) substation received only a limited number of salmon eggs owing to exceptionally poor runs. Over one-half million trout eggs of the four species were shipped in with the object of concentrating on the propagation of trout at this point in the future. The new road giving access to this hatchery was completed during the year.

The Mount Rainier substation incubated a total of 1,000,000 trout eggs for the production of fish to be used in stocking waters of the national park. Throughout the year considerable trouble was experienced with various diseases.

In the California field various improvements were made to the Baird hatchery and substations through C. W. A. allotments. The fish cultural activities were substantially the same as in the previous year.

GREAT LAKES SPECIES

The output of the commercial forms of the Great Lakes was greatly reduced with the exception of pike perch. The two Michigan substations, auxiliaries of the Northville (Mich.) station, were closed early in the fiscal year and achieved no output except several hundred thousand lake trout which were being reared by the Alpena (Mich.) substation. These were planted early in the year.

The field of operations of the Duluth (Minn.) station was greatly restricted owing to the fact that no fishing was allowed during the closed season for the purpose of taking whitefish or lake trout eggs. A few days fishing after the closed season was ended permitted the collection of 1,500,000 lake trout eggs. Under the same conditions approximately 500,000 whitefish eggs were obtained. Eggs of game trout were incubated and distributed from this point. Cooperative arrangements were effected with the Minnesota Fish and Game Department to handle the collection of pike-perch eggs in the spring, but the run was light, yielding only approximately 7,000,000 eggs.

At the Put in Bay (Ohio) station the sudden advent of cold weather resulted in the cessation of fishing for whitefish before it was possible to secure a large number of eggs, so that only 11,500,000 were obtained. However, the spring collection of pike-perch eggs was the largest since the station has been in operation. The collections of this species amounted to 830,000,000, of which over 500,000,000 were incubated at the Ohio State hatchery, the balance being handled at the Bureau's station. This hatchery was operated under cooperative arrangements with the State of Ohio, whereby that agency attended to the distribution.

The Cape Vincent (N. Y.) station was much more active in connection with the propagation of game fish than with the commercial varieties. Only 250,000 lake trout eggs were obtained, no whitefish being handled. The curtailment in this phase of the station's activity was caused by a lack of funds to permit the placing of spawntakers.

MARINE STATIONS

The production of marine species was obtained from two hatcheries only, the establishment at Gloucester (Mass.) being placed out of commission.

The Woods Hole (Mass.) hatchery was kept open, inasmuch as it was also a base for scientific investigations. A few brood cod were secured but owing to the limited numbers and the expense of pumping water to retain them until the eggs were matured, they were discarded and no eggs of this species were handled. The station undertook the propagation of flounder during the month of January, but extreme weather conditions proved to be an insurmountable obstacle; and in order to save the nets it was necessary to discontinue this attempt after a moderate number of eggs, amounting to 136,000,000, were secured. A limited number of mackerel eggs were collected and hatched later in the year.

All of the buildings were repainted, both interior and exterior, and a number of minor improvements were made.

At the Boothbay Harbor (Maine) station activities were somewhat curtailed owing to the lack of funds. However, in spite of this handicap and unfavorable weather conditions, 900,000,000 flatfish eggs were secured and incubated, which is approximately one-third of the number handled the previous year.

With the cod, an increase in the number of eggs was obtained owing to the fact that the market fishermen were taking an increased number of fish and the Bureau was able at moderate cost to salvage the eggs and either hatch them or plant them after fertilization on the spawning grounds.

There was also a drop in the yield of haddock to a level approximately one-third of last year's output.

Through a P. W. A. allotment a considerable number of necessary repairs were made including replanking the main wharf, reconditioning the dwellings, and painting the station buildings.

ANADROMOUS SPECIES OF THE ATLANTIC COAST

The only station devoted exclusively to the propagation of commercial species native to the coastal rivers of the Atlantic coast is the Fort Humphreys (Va.) station. The propagation of shad is the main activity. No effort was made to hatch yellow perch at this point because of the shortage of funds. The same reason impelled the curtailment of shad work with a take of 6,500,000 eggs in comparison with normal collections of twice or three times this amount. Shad were also propagated at the Edenton (N. C.) station where results were more favorable. The output of shad at this point amounted to approximately 3,500,000 fry. Very little success attended the effort to propagate glut herring. This was partly caused by the fact that the run of fish appeared to spawn within a very short period before an adequate number of spawntakers could be employed. This station also handled yellow perch as in previous years, securing about 4,000,000 fry. Limited attention was given to the propagation of white perch, and a small output of 90,000 fry was obtained. Shad were also propagated in cooperation with the State of South Carolina on the Edisto River, this work being handled by the Orangeburg (S. C.) station. A production approximately equivalent to the normal average was obtained and planted in local waters.

The only other commercial species in this category which has been handled by the Bureau in recent years was the Atlantic salmon. However, owing to inability to secure the usual supply of eggs from the Canadian Government, the Craig Brook (Maine) station at which this work is conducted, made distribution of only 20,000 Atlantic salmon which were held over from the previous fiscal year.

GAME FISH PROPAGATION

The increasing demand for wider participation of the Federal Government in the conservation of natural resources, particularly in the fields of forestation, water conservation, and the replenishment and protection of wildlife, has confirmed the importance of the Bureau's activities in the propagation of game fish. It was decided, therefore, to concentrate attention upon the propagation and distribution of those forms which are required to maintain good fishing in the public domain and in all public waters. The relative proportion of game fish in the total hatchery output increased therefore from approximately 2 percent to 4.1 percent. Strictly game forms distributed by the division numbered 135,000,000 during the fiscal year. It was not possible, owing to depleted funds, to rear as large a portion of these fish to as large a size as the requirements for practical fish-cultural work would dictate. Furthermore, the output was maintained by concentrating upon production and calling upon the public, particularly sportsmen's organizations, to cooperate in meeting the distribution costs, thereby relieving the Bureau in part of one of its heaviest expenses. The Bureau made some distribution with its own facilities including the fish cars where long hauls were involved. There was a definite increase in the output of 10 different varieties of game fish. Included in these were all the important varieties of trout, and the largemouth and smallmouth bass.

ROCKY MOUNTAIN TERRITORY

A small increase in personnel was provided for the Salt Lake City (Utah) headquarters owing to the fact that supervision of activities for both the Rocky Mountain territory and the Pacific coast section was consolidated in this office. Aside from the normal direction of fish cultural activities, the district supervisor was also placed in general direction of the construction of fish screens as carried on under a P. W. A. allotment.

At the Yellowstone Park hatchery the collection of black-spotted trout eggs for the season of 1933–34, including parts of both fiscal years, exceeded all previous records with but one exception. The take amounted to over 28,000,000 eggs.

A hatchery building previously constructed at Grebe Lake was used for the incubation of grayling eggs. Over 2,000,000 eggs of this species were secured and yielded the unusually high percentage of hatch of 94.4 percent. Auxiliary rearing ponds were maintained at Mammoth Hot Springs, at which point 183,000 rainbow trout fingerlings were produced. It was reported that the catch of fish in Yellowstone Park increased approximately 16 percent over the previous year.

The collection of rainbow trout eggs from brood stock at the Springville (Utah) station was slightly more than half the take of the previous year, owing to the fact that the older fish are being discarded and a new brood stock is being built up. A few largemouth bass were produced at the hatchery in a small pond developed for this purpose. This station enjoyed the benefit of P. W. A. and C. W. A. allotments which permitted the construction of a concrete raceway nearly 600 feet in length for the improvement of the main water supply. It was also possible to effect other improvements, particularly to the grounds.

At the Bear Lake (Utah) substation special allotments permitted the construction of 3 concrete and 2 natural dirt rearing ponds. These could not be placed in use because of the construction of a new dam which affected the water supply. One million three hundred seventy-five thousand eggs were handled at this point and a satisfactory production and distribution was achieved from this source.

The Spearfish (S. Dak.) station had a very successful season with an output approximating the highest previous records. Extensive improvements to the grounds and buildings were placed in effect by virtue of a C. W. A. allotment. Probably the most important accomplishment was the construction of new rearing ponds and the improvement of old ones. Water-supply difficulties at this point were overcome by the laying of a pipe line to connect with the city water line.

The Saratoga (Wyo.) station also experienced one of the best seasons in its history as far as the output of fish is concerned, although the total collections of eggs were reduced as a result of discontinuing one of the field egg-collecting stations. It was possible to increase the take of eggs from the trout brood stock held at the station. Here, too, special allotments from the Federal relief organizations permitted extensive improvements including the painting of buildings, installation of curb and gutters, and improvements to drives as well as the construction of about 600 feet of stone wall along the creek running through the station grounds. The program for landscaping this station was continued with over 525 trees having been planted and much of the brush being removed.

In the Colorado territory, the Leadville station was operated along the usual lines. Among the improvements were the lowering of the ceiling in the hatching room so as to economize on heating. The pond system was overhauled and a new water-supply intake dam was constructed to feed the Crystal Lake auxiliary project.

The Creede (Colo.) substation increased its usefulness and importance in spite of depleted funds. Work was started on the erection of a new dwelllng at this substation.

The Dexter, N. Mex., station propagates no trout in contrast with other stations in this field but serves an important territory where there is a heavy demand for pond fish, particularly bass. Due to fall in the water supply, it was necessary to undertake the distribution of fish earlier than usual which resulted in an increase of 38 percent over the output for the previous fiscal year. The aid of the State fish and game department was enlisted in distributing the fish. Throughout the year improvements to the grounds, equipment, and buildings were under way. The provision of additional pond space has been continued and three new wells were drilled to add to the water supply. An office building was completed and two small pump houses were constructed.

The Bozeman, Mont., station is headquarters for important activities with auxiliaries located at Ennis and Miles City, Mont., where pondfish are propagated, and at Glacier Park. Fish cultural work at Bozeman was conducted with gratifying success, and extensive improvements with funds derived from P. W. A. and C. W. A. sources were provided. This consisted of reconditioning of the hatchery, the conversion of a stable into a duplex dwelling, improvements to the domestic water supply, construction of rearing ponds, and the starting of construction of an ice house and refrigerator room. The work in the Madison Valley was centered at Ennis, where a new hatchery was placed in active operation at the beginning of the fiscal year. The collection of Loch Leven trout eggs in this field amounting to 28,500,000 exceeded all previous records. The yield of pond fish at the Miles City auxiliary station was fully adequate to meet requirements. A change in policy was established by the practice of wintering the adult brood stock in a small leased lake rather than attempting to hold them in the larger Miles City ponds where previous experience has shown a heavy mortality during the winter. The total yield of fish from this source was over 316,000 which was below the record for the previous year but the fish appeared to be of larger size.

The Glacier Park substation was operated as usual, incubating eggs and rearing fingerlings shipped in from other hatcheries. Difficulty was experienced when the chlorinated water supply used by the Park Hotel gained access to the hatchery water supply and caused a heavy loss of fish. While this loss was serious for the present season, it is being easily controlled by the installation of a suitable valve.

NEW ENGLAND STATIONS

The Nashua, N. H., station carried on its activities in a normal manner with production approximating that of previous years.

At the Hartsville, Mass., station the full requirements for its own brook trout egg supply were met from the station's brood stock and over 300,000 were shipped elsewhere. A new cement dam was constructed for one of its rearing ponds and other improvements effected. The most outstanding feature was the collection, in cooperation with the State of Connecticut, of over 580,000 smallmouth bass fry from lakes in Connecticut which are closed to fishing. The fish obtained in this manner were divided in equal proportions between the State and the Bureau's applicants.

The activities of the St. Johnsbury, Vt., station were centered at the York Pond, N. H., auxiliary which has been under development for a number of years. The work at St. Johnsbury was confined to cooperative rearing of fish in conjunction with the State of Vermont. At the York Pond establishment the egg collections of brook trout amounted to over 9,700,000. In addition to the fish-cultural work at this point extensive development has been under way through a P. W. A. allotment, the assignment of relief labor, and the utilization of C. C. C. workers. Among the accomplishments were the provision for a domestic water supply, the extension of the canal and pipe-line systems and the construction of a new power house and supply canal. Another important project was the rebuilding of Diversion Pond, one of the trout ponds which was washed out during a period of heavy rainfall. Numerous other jobs incidental to the development of this extensive project were also prosecuted during the year.

In Maine the Grand Lake Stream auxiliary was closed during the forepart of the fiscal year and the responsibility of its operation assumed by the Maine Department of Inland Fish and Game. All fish on hand amounting to over 500,000 landlocked salmon and brook trout were distributed prior to the transfer. The State of Maine under a working agreement furnished the Bureau with a limited number of landlocked salmon eggs which were formerly collected at this point.

At the main station located at Craig Brook, operations were successful and the collection of brook-trout eggs amounting to 7,385,000 exceeded all previous takes. A considerable amount of repair work was done on the ponds and drainage system, much of it being required by the severe winter which caused extensive damage. In contrast with previous years the services of a fish car were not utilized in distributing the output of fish. The fingerling salmon and trout were largely planted by inducing applicants to receive them at the hatchery.

COMBINATION TROUT AND POND-FISH STATIONS

Owing to the overlapping in the natural range of the trout and warm-water species such as bass, a number of hatcheries are called on to supply fish of both groups. Consequently, where natural conditions permit, the hatcheries are developed so as to propagate the two different types. However, as a rule, a hatchery suitable for the propagation of trout does not offer optimum conditions for breeding warm-water fish and as a consequence the latter activity is more or less supplementary and the output of bass, sunfish, etc., at the combination stations is usually of limited numbers.

The White Sulphur Springs (W. Va.) station duplicated its success of the previous year and handled approximately 5,400,000 trout eggs, producing an output of fish for distribution of over 3,000,000. Cooperative arrangements with the West Virginia Conservation Commission were again maintained, and the Bureau incubated 1,000,000 brook trout eggs for that agency. The output of warm-water species was improved in that the fish distributed were of larger size. Some improvements in the nature of widening and straightening the creek channel through the station grounds, and painting the station buildings were undertaken.

The Wytheville (Va.) station now functions as an important unit in the production of rainbow trout eggs, furnishing approximately 2,750,000. The output of trout from this station and its auxiliary seasonal rearing stations is eminently satisfactory. The bulk of the production of pond fish consisted of bream and rock bass. An electrical refrigerating system was installed as well as an electric pumping system for filling shipping cans. Aside from painting the station buildings, 1,000 feet of water supply pipe line was replaced.

The Manchester (Iowa) station also produced a large number of rainbow trout eggs but experienced an unfavorable season as far as the pond fish were concerned, owing to unfavorable weather conditions. The station cooperated with a local sportsmen's association in the establishment and operation of a large smallmouth bass rearing pond.

C. W. A. labor was used in effecting numerous minor improvements to the buildings and grounds.

At the Leetown (W. Va.) station an important activity has been the construction and development effected through a P. W. A. allotment. This covered the construction of a large reservoir and 5 new bass ponds ranging from 1 to 3 acres in area. Several of the older ponds were improved and the raceway system was entirely rebuilt and enlarged. Circular rearing pools were also completed. Further work was performed on the buildings including a concrete floor in the garage, and the finishing of the second floor of this building. Construction of a house for the director was started and was well underway at the end of the fiscal year. Fish-cultural activities yielded a large take of eggs but the percentage of fertility was low because of the fact that the eggs were taken from young fish. Effort was made to propagate smallmouth bass, but as the ponds were in readiness late in the season the brood stock could not be secured in time to yield a large number of fry. Experimental activities at Leetown are described in the annual reports of the Division of Scientific Inquiry.

The Flintville (Tenn.) station in its second year of operation distributed approximately 150,000 fingerling trout. Work with the rainbow species was successful but, as previously, heavy mortality was experienced with the brook trout and brown trout. Through the allotment of C. W. A. labor, seven bass ponds were constructed and the station grounds cleared up and improved. Owing to the delay in getting the ponds ready for use, the production of bass and other pond fish was negligible.

Activities at the Erwin (Tenn.) station were largely of a routine nature and the results comparable to those of previous years. Improvements were effected by the expenditure of a P. W. A. allotment permitting the dredging of mud from ponds and improvements to the buildings. The station handled 200,000 rainbow trout fingerlings on a cooperative basis whereby the Tennessee Fish and Game Department provided the food and arranged for the distribution during the fall of 1934.

The Cape Vincent (N. Y.) station showed indications of a limited fall production of smallmouth bass owing to failure of spawning. This station carried on its trout work at the three substations located at Cortland, Watertown, and Barneveld. The cooperative project at Rochester, N. Y., was also listed as one of the activities coming under the scope of the Cape Vincent station.

The Northville (Mich.) station conducted its fish-cultural work with average success and in addition carried on some improvements to the buildings and grounds.

Mention may be made of the new establishment at Lamar, Pa., the site for which had been acquired sometime previously. Active work commenced under a P. W. A. allotment in the fall of 1933 and consisted of remodeling a cottage into a dwelling for the superintendent. There was also erected a combination garage and workshop.

Two large trout ponds were completed, and a start was made on the construction of circular pools and raceways. Three hundred yards of road was built to service the new construction and the 153 acres of station property were cleared and trimmed of brush. Considerable fencing was moved, and a ditch was dug for the placement of a pipe line to run to the hatchery site. One hundred and twenty-five thousand brook and rainbow trout were shipped to the station in the spring with the intention of feeding them and rearing them for fall distribution.

POND-FISH STATIONS

The demand for the warm-water pond fish has continued unabated and the stations propagating this species have in a number of instances exceeded previous output. The provision of additional pond space is in most instances the only means whereby the production of bass, sunfish, crappie, etc., can be materially increased.

At Tupelo, Miss., one pond was enlarged in area and a concrete retaining wall was constructed for the protection of the pond embankments. The output of black bass and bream was of approximately normal proportions, but the distribution was restricted because of shortage of funds.

At the new Marion (Ala.) substation extensive construction work was under way during the year which resulted in the development of approximately 60 acres of pond space, together with an office building, shop, and garage, two dwellings, a reservoir, and several flowing wells for water supply. In spite of the construction and development activities the propagation of fish was also carried on with a distribution of over 300,000 bass and bream with approximately 100,000 fingerlings being held at the close of the year.

In the Texas field, the San Marcos station effected considerable improvements and developments including the replacement of the water-supply line, additional drainage facilities, construction of concrete ponds, and other general improvements. The output of bass was less than that of the previous year. This station continued the propagation of channel catfish with greater success than heretofore.

With a P. W. A. and C. W. A. allotment construction was started at a new hatchery at San Angelo, but at the close of the year work had not been carried to a point where this station could be placed in production.

The Fort Worth (Tex.) substation had the largest distribution of bass in its history.

The Orangeburg (S. C.) station was enlarged as to its pond space and the fish-cultural operations were of the usual effectiveness.

At both Tishomingo (Okla.) and Natchitoches (La.), extensive development work was under way. At the latter point adverse weather conditions resulted in very slow progress in the provision of additional pond space. Experimental work in the propagation of bass has been carried on at the Natchitoches station, a biologist being detailed to carry on this activity.

The acquisition of fish from leased ponds at Langdon, Kans., was greatly reduced owing to shortage of funds, and all work in this field was discontinued entirely at the close of the fiscal year.

The Mammoth Springs (Ark.) station was operated very efficiently at low cost and produced over 500,000 bass, rock bass, and bream.

A great improvement effected at the Louisville (Ky.) station was the replacement of the old electrical pumping system which had deteriorated to a point where it was very expensive to operate and was not dependable. Other improvements included painting and repairing of buildings and improvements to ponds. The output of fish was materially increased over the previous year. This station concentrates upon the smallmouth bass, it being one of the chief sources of supply for this species and 475,000 bass were distributed.

At the Warm Springs (Ga.) station general improvements were carried on. The output of fish was approximately of normal proportions.

At the Valdosta (Ga.) station, only a small output of fish was obtained because of the fact that the water supply could not be properly controlled. This establishment has many unusual features, and P. W. A. and C. W. A. funds were expended for improvements and developments which will give more adequate control of the available water supply and provide adequate drainage to wells.

The Fairport (Iowa) biological station was continued in operation for strictly fish-cultural purposes and enjoyed a successful season. Some rescue work was carried on in local waters by the station force.

The Crawford (Nebr.) station handling both trout and warm-water fish was able to provide additional pond space and effect other improvements while turning out a successful production of pond fish.

MISSISSIPPI RIVER TERRITORY

Diverse activities including fisheries administration in the Upper Mississippi Wild Life Refuge, rescue or salvage activities, propagation of trout and pond fish, and immediate supervision of the fish hatcheries at Lake Mills, Wis., and Rochester, Ind., come under the jurisdiction of the district supervisor located at the La Crosse (Wis.) station. At La Crosse, the trout culture was carried on successfully although there were temporary outbreaks of disease. A large number of trout were furnished for cooperative nurseries in Minnesota and Wisconsin. Another noteworthy accomplishment was the successful production of bass in a 5-acre pond located at the main station. This pond produced over 70,000 fingerling bass. Other semicontrolled ponds located in the refuge failed to be as productive owing to the fact that they were overflowed, and coarse or predatory fish gained access. Rescue activities have been discussed elsewhere in this report. The substations located at Marquette and Bellevue, Iowa, were operated by the Iowa Conservation Commission.

The Homer (Minn.) substation was utilized as a base for rescue operations, and also for the overhauling and maintenance of equipment, particularly boats, trucks, etc.

At Lake Mills, Wis., 7 new ponds were excavated having an area of 1 acre each and the necessary water pipe supply line laid. Other improvements were effected through the use of P. W. A. and C. W. A. allotments. A limited number of bass were produced in the ponds, but owing to lake conditions they were not in proper condition for fish cultural use. Trout culture was attempted, but the results were unsatisfactory owing to improper water supply apparently.

During the year active construction was under way at the new Rochester (Ind.) station, the work being performed successively under

P. W. A. allotment, C. W. A. assignment, and at the close of the year through the use of relief labor. The developments initiated consisted of two dwellings, a combination shop and garage, and a tank or holding house. In addition, the pond system was greatly extended. However, at the close of the year there still remained a considerable potential pond area awaiting development. Brood stock of pond fish was secured, and the hatch of fish appeared reasonably satisfactory in view of conditions. This station also achieved a distribution of bass and sunfish, during the fall of 1933, from the limited number of ponds which had been previously constructed and placed in operation. Assistance was rendered by the State of Indiana in the distribution of bass, sunfish, etc., produced at this station.

AQUARIUM

The Bureau of Fisheries Aquarium has consistently increased in popularity and has become an important point of interest to visitors. During the school year classes in biology from Washington and adjacent territory have made frequent visits to it for educational purposes. There has been an insistent demand that the aquarium be kept open on Sundays and holidays in order to accommodate visitors who could not come at other times.

During the year 1,533 specimens of fish, comprising 62 species, and 107 aquatic animals of 6 varieties were on display. The trout collection, in particular, has been considered one of the finest in the country. Some difficulty has been encountered during the summer months in keeping the fish in good condition, owing to the high temperatures of the city water supply which caused the rapid development of parasites and the constant application of remedial measures. It has been the practice to make a special display of new and odd specimens which may be of unusual public interest.

Model hatching equipment, in a modified form, has been set up to demonstrate the methods followed in propagating trout, salmon, perch, shad, and wall-eyed pike.

The director has been called upon to furnish information and advice on the construction and maintenance of ornamental fish pools, home aquariums, etc., on frequent occasions.

FISH CULTURAL NOTES

HATCHING SALMON EGGS ON STACKED TRAYS

There has previously been given considerable attention to the carrying of salmon fry on stacked trays in preference to use of the egg baskets. The report of a large-scale experiment of this nature at both the Big White and Little White Salmon (Oreg.) substations throws further light on this matter. One million nine hundred thousand eggs were hatched by this method. When the first indication of hatching appeared eggs were picked over and placed on stacked trays, each tray carrying 3,000 eggs. The resulting fry hatched on the trays were not cleaned up at any time during the sac absorption period, and it was found that the loss of fish handled in this manner was considerably less than with those handled in the usual way. The greatest loss was reported as being not to exceed 10 or 12 per tray of 3,000 eggs, and in many trays there was not a single dead fry.

The experiment was watched carefully to determine whether the shells disintegrated or would clog the screen and it was found that the shells had disappeared within a week after the eggs hatched. The benefits of this method are cited as being a reduction in the loss of fry and a marked curtailment of the work involved during the hatching season. It is pointed out, however, that at other hatcheries having a colder water temperature, the egg shells might not as readily disintegrate and the system would not work as well. The volume of water which was utilized was the same as that employed with the older method of using baskets.

DISCONTINUANCE OF FISH-CULTURAL NOTES

It has been decided to refrain from the further publication of items under the heading of Fish Cultural Notes in the divisional report. Since this is only issued annually, it is felt desirable that current fish cultural information be made more immediately available. With this object in view a monthly leaflet or bulletin entitled "The Progressive Fish Culturist" will be issued and circulated to the Bureau's employees and others interested. This will contain notes of recent current developments in fish culture, methods, technique, and practices. Developments and improvements in methods at the Bureau's stations, therefore, will be circulated so that they can be adopted elsewhere without waiting for a period of a year or more.

DISTRIBUTION OPERATIONS

The decrease in the output of fish was reflected in a curtailment of distribution activities both by the fish cars and by other means. The distribution cars made 71 trips in delivering fish and carried an average of 250 pails per trip. In making this distribution the cars traveled 38,134 paid miles and 10,348 free miles. Detached messengers made 74,516 paid and 15,762 free miles in delivering fish. The number of miles traveled by distribution cars was less than one-half that in 1933, while there was likewise a marked diminution in the travel by detached messengers and station trucks. During 1934, distribution by the latter means covered 38,526 miles. As heretofore, the Bureau was the beneficiary of transportation without cost or at reduced rates furnished by a number of railroads.

The modification in distribution policy necessitated by the curtailment of appropriations has resulted in a considerable number of unfilled applications, principally in sections at a distance from the points of production.

It has been the general policy to notify all applicants when fish are available for distribution, advising them that they will be expected to receive the fish at the hatchery or otherwise defray the costs of delivery. Detailed arrangements for such deliveries are made with the applicant directly by superintendents of the stations furnishing the fish, and are not handled by the Washington office. It is impracticable for the headquarters office to make definite and specific arrangements as to field deliveries owing to many conditions and circumstances which may arise. Where shipments to a given section can be consolidated, the cost of delivery to the individual applicant is kept at a low figure. After allowing adequate time for applicants to make arrangements for receiving the fish the balance of the season's production is planted directly by the Bureau's employees in suitable waters within close proximity to the hatchery. The marked reduction in distribution costs has made it possible to keep in operation a number of hatcheries which would otherwise be closed because of shortage of funds.

Summary, by species, of the distribution of fish, fiscal year 1934

State and species	Number
Alabama:	
Largemouth black bass	276,243
Crappie	600
Sunfish	183,625
Alaska: Sockeye salmon	14,073,000
Arizona:	
Rainbow trout	10,000
Loch Leven trout	929,880
Arkansas:	
Rainbow trout	8,300
Crappie	30
Largemouth black bass	205,580
Smallmouth black bass	109,060
Rock bass	600
Sunfish	31,100
California:	
Chinook salmon	3,658,300
Rainbow trout	125,000
Brook trout	25,000
Colorado:	
Steelhead salmon	50,000
Rainbow trout	1,598,490
Black-spotted trout	979,400
Loch Leven trout	2,681,980
Lake trout	14,000
Brook trout	7,583,029
Connecticut:	
Brook trout	1,000
Loch Leven trout	100,360
Smallmouth black bass	377,000
Delaware: Largemouth black bass	300
Florida:	
Largemouth black bass	6,010
Sunfish	380
Georgia:	
Catfish	600
Rainbow trout	601,745
Loch Leven trout	151,320
Brook trout	76,100
Largemouth black bass	312,680
Crappie	180
Sunfish	245,995
Yellow perch	375
Idaho:	
Catfish	60
Chinook salmon	159,250
Steelhead salmon	127,000
Rainbow trout	2,792,640
Black-spotted trout	5,211,020
Loch Leven trout	100,000
Brook trout	60,000
Smallmouth black bass	2,400
Illinois:	
Catfish	1,430
Crappie	3,980
Largemouth black bass	9,450
Smallmouth black bass	900
Sunfish	3,240
Indiana:	
Catfish	600
Rainbow trout	28,000
Loch Leven trout	21,800
Brook trout	27,500
Crappie	2,985
Largemouth black bass	124,825
Smallmouth black bass	23,200
Rock bass	150
Sunfish	6,307
Yellow perch	3,200
Iowa:	
Catfish	231,150
Buffalofish	[1] 42,600
Iowa—Continued.	
Carp	[1] 784,850
Rainbow trout	149,955
Loch Leven trout	5,000
Brook trout	94,150
Pike and pickerel	55
Crappie	33,500
Largemouth black bass	38,260
Smallmouth black bass	18,000
Sunfish	33,515
White basses	485
Yellow perch	6,420
Miscellaneous fishes	9,300
Kansas:	
Rainbow trout	24,000
Crappie	2,925
Largemouth black bass	47,780
Rock bass	800
Sunfish	2,080
Yellow perch	1,200
Kentucky:	
Rainbow trout	10,500
Largemouth black bass	155,310
Smallmouth black bass	183,003
Rock bass	2,825
Sunfish	23,900
Louisiana:	
Largemouth black bass	45,538
Warmouth bass	12,350
Sunfish	331,140
Maine:	
Atlantic salmon	20,890
Landlocked salmon	368,720
Lake trout	500,100
Brook trout	2,509,410
Smallmouth black bass	18,000
Cod	1,037,262,000
Haddock	191,754,000
Winter flounder	809,811,000
Maryland:	
Rainbow trout	12,303
Loch Leven trout	7,550
Brook trout	16,500
Crappie	100
Largemouth black bass	15,954
Smallmouth black bass	16,500
Sunfish	11,200
Massachusetts:	
Rainbow trout	202,500
Brook trout	202,330
Mackerel	2,946,000
Smallmouth black bass	24,316
Winter flounder	127,549,246
Michigan:	
Catfish	244
Whitefish	430,000
Steelhead salmon	97,745
Rainbow trout	192,000
Loch Leven trout	46,665
Lake trout	926,500
Brook trout	597,400
Crappie	3,200
Largemouth black bass	24,895
Smallmouth black bass	42,950
Sunfish	3,645
Yellow perch	700
Minnesota:	
Catfish	3,859,520
Buffalofish	[1] 13,350
Carp	[1] 717,905
Rainbow trout	56,100
Loch Leven trout	133,200

[1] All buffalofish and carp shown in above table are planted in commercial areas of the Mississippi River.

Summary, by species, of the distribution of fish, fiscal year 1934—Continued

State and species	Number
Minnesota—Continued.	
Brook trout	201,100
Pike and pickerel	60,100
Crappie	8,653,213
Largemouth black bass	830,345
Smallmouth black bass	1,012
Sunfish	1,556,770
Pike perch	6,600,000
Yellow perch	1,908,480
White bass	13,550
Fresh-water drum	6,580
Miscellaneous fishes	2,331,600
Mississippi:	
Crappie	2,800
Rainbow trout	5,000
Largemouth black bass	211,833
Sunfish	189,350
Missouri:	
Catfish	1,460
Rainbow trout	23,830
Crappie	12,685
Largemouth black bass	234,660
Smallmouth black bass	58,740
Rock bass	6,020
Sunfish	31,390
Yellow perch	960
Montana:	
Catfish	9,326
Rainbow trout	983,050
Black-spotted trout	1,758,337
Loch Leven trout	5,416,360
Brook trout	92,310
Crappie	18,231
Largemouth black bass	22,889
Sunfish	73,455
Yellow perch	73,997
Miscellaneous fishes	28,239
Nebraska:	
Catfish	59,000
Rainbow trout	769,875
Loch Leven trout	237,800
Brook trout	161,500
Crappie	2,650
Largemouth black bass	59,870
Sunfish	2,880
Nevada:	
Rainbow trout	10,000
Black-spotted trout	400,000
New Hampshire:	
Landlocked salmon	12,600
Rainbow trout	172,100
Lake trout	32,500
Brook trout	3,211,819
Smallmouth black bass	38,300
New Jersey:	
Rainbow trout	2,000
Loch Leven trout	800
Brook trout	2,000
Largemouth black bass	1,120
Sunfish	360
New Mexico:	
Catfish	5,900
Rainbow trout	1,651,000
Black-spotted trout	3,325,000
Loch Leven trout	1,020,000
Brook trout	132,500
Largemouth black bass	528,700
Sunfish	36,400
New York:	
Landlocked salmon	2,000
Rainbow trout	101,391
Black-spotted trout	970
Loch Leven trout	37,850
Lake trout	42,428
Brook trout	255,375
Largemouth black bass	5,216

State and species	Number
New York—Continued.	
Smallmouth black bass	134,515
Sunfish	1,830
North Carolina:	
Catfish	3,036
Shad	3,500,000
Rainbow trout	313,040
Brook trout	150,500
Crappie	3,480
Largemouth black bass	182,238
Sunfish	25,045
Yellow perch	3,900,075
White perch	900,000
North Dakota: Rainbow trout	14,000
Ohio:	
Catfish	5,200
Whitefish	8,850,000
Rainbow trout	72,500
Loch Leven trout	66,950
Brook trout	2,150
Crappie	820
Largemouth black bass	18,310
Smallmouth black bass	57,150
Sunfish	6,165
Pike perch	830,025,000
Oklahoma:	
Catfish	2,700
Rainbow trout	1,686
Crappie	25,050
Largemouth black bass	50,932
Rock bass	29
Warmouth bass	102
Sunfish	57,205
Yellow perch	1,866
Oregon:	
Chinook salmon	9,527,176
Silver salmon	571,575
Steelhead salmon	316,230
Rainbow trout	489,000
Black-spotted trout	3,520,240
Loch Leven trout	640,050
Brook trout	560,000
Pennsylvania:	
Catfish	60
Rainbow trout	352,100
Loch Leven trout	214,300
Brook trout	1,055,018
Largemouth black bass	2,200
Sunfish	2,135
South Carolina:	
Catfish	3,628
Shad	1,624,000
Rainbow trout	571,000
Loch Leven trout	4,000
Brook trout	44,625
Crappie	92
Largemouth black bass	185,206
Warmouth bass	350
Sunfish	83,782
Yellow perch	3,025
South Dakota:	
Catfish	43,200
Rainbow trout	736,510
Loch Leven trout	1,599,215
Brook trout	725,270
Crappie	1,500
Largemouth black bass	25,150
Sunfish	2,800
Yellow perch	850
Tennessee:	
Catfish	1,040
Rainbow trout	891,040
Loch Leven trout	49,500
Brook trout	86,650
Largemouth black bass	48,530
Smallmouth black bass	430

Summary, by species, of the distribution of fish, fiscal year 1934—Continued

State and species	Number	State and species	Number
Tennessee—Continued.		Washington—Continued.	
Rock bass	18,400	Rainbow trout	163,300
Sunfish	34,295	Black-spotted trout	1,372,415
Yellow perch	35	Loch Leven trout	596,130
Texas:		Brook trout	1,079,470
Catfish	7,180	Crappie	3,032
Crappie	17,381	Largemouth black bass	6,200
Largemouth black bass	642,925	Sunfish	22,150
Warmouth bass	800	Yellow perch	8,516
Sunfish	131,725	West Virginia:	
Rio Grande perch	8,840	Catfish	2,400
Utah:		Rainbow trout	609,948
Whitefish	400,000	Loch Leven trout	16,100
Landlocked salmon	44,290	Brook trout	1,109,564
Rainbow trout	1,630,108	Crappie	350
Black-spotted trout	317,000	Largemouth black bass	8,425
Loch Leven trout	1,463,076	Smallmouth black bass	60,670
Brook trout	1,085,900	Sunfish	761
Largemouth black bass	5,039	Wisconsin:	
Vermont:		Catfish	3,470,966
Atlantic salmon	14,800	Buffalofish	[1] 7,772,430
Landlocked salmon	79,725	Carp	[1] 7,002,942
Rainbow trout	40,375	Rainbow trout	252,600
Loch Leven trout	8,500	Loch Leven trout	387,400
Lake trout	26,000	Brook trout	644,000
Brook trout	2,963,997	Pike and pickerel	64,855
Smallmouth black bass	58,100	Crappie	8,930,300
Virginia:		Largemouth black bass	986,120
Shad	6,450,000	Smallmouth black bass	17,540
Rainbow trout	305,028	Sunfish	1,894,740
Loch Leven trout	8,180	Yellow perch	1,926,995
Brook trout	194,200	White bass	18,450
Crappie	975	Fresh-water drum	6,580
Largemouth black bass	52,026	Miscellaneous fishes	2,683,700
Smallmouth black bass	2,505	Wyoming:	
Rock bass	26,083	Catfish	123,900
Sunfish	96,640	Rainbow trout	1,501,600
Yellow perch	100,000	Black-spotted trout	15,249,515
Washington:		Loch Leven trout	2,754,821
Catfish	2,000	Brook trout	1,013,705
Chinook salmon	13,972,000	Grayling	5,240,320
Chum salmon	11,857,600	Crappie	7,800
Silver salmon	1,060,850	Largemouth black bass	105,430
Sockeye salmon	9,521,141	Rock bass	550
Humpback salmon	138,675	Sunfish	8,125
Steelhead salmon	1,516,500	Yellow perch	54,550

[1] All buffalofish and carp shown in above table are planted in commercial areas of the Mississippi River.